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# EDUCATIONAL ADMINISTRATION

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# EDUCATIONAL ADMINISTRATION

## QUANTITATIVE STUDIES

BY

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AND

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TEACHERS COLLEGE, COLUMBIA UNIVERSITY

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## PREFACE

It is the purpose of this book to enable students of education to learn some of the methods and results of recent scientific studies of school administration. Teachers of education in universities feel the need of supplementing students' acquaintance with the common-sense principles of school management by some study of impartial and exact investigations which carry knowledge beyond conventional opinions, no matter how sagacious.

At present they must, to do this, rely solely upon lectures or require students to read long, technical and highly specialized reports of original investigations, access to which is often difficult, especially in the case of large classes.

The selections quoted or summarized in this volume are deliberately chosen from the work that has been done at Teachers College, Columbia University, in the application of quantitative methods to administrative problems. This seemed best for two reasons. The contents of the volume have thus a natural unity of purpose, method and subject matter. The likelihood is thereby increased that similar volumes will be prepared adapting for students' use the work done by other natural groups of investigators.

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# PART I

# STUDIES OF THE STUDENTS

# EDUCATIONAL ADMINISTRATION

## § 1. Enrollment in Relation to Age and Grade

Two of the very easiest facts to observe and record about the pupils in any school are *age* and *grade*. If they are recorded as in Table 1 on the following page, even these simple items tell much about the working of the school in question. Thus, looking at each vertical column, one sees at once the enormous variability in age of those who reach the same grade or educational standard. In the third grade in Connecticut in 1903, children were reported as young as four years and as old as seventeen. To include nine tenths of the children in this grade, a range of five years is required. Over three years are required to include even three fourths of them. In the fourth grade, only a quarter of the children are of the so-called "normal" age of ten; a fifth of them are twelve or over; in a class of forty there will usually be one child fourteen or more years old and four children eight or less. In the elementary school, even in the lower grades, there are many adolescents, beginning to be moved by the instincts of adult life. In the high school are many boys and girls under fifteen who, though intellectually gifted, are physically, emotionally, and in social instincts little children.

The reader may well think through each column of this table, considering the practical significance of the variability of each grade. Grades 9–13, it will be noted, are ambiguous. Grade 9 means in some cities and towns the last grammar grade, and in others the first high-school grade; grade 10 means a combination of the first high-school grade of some, and the second of other, cities; and so on for grades 11, 12, and 13.

TABLE 1

THE DISTRIBUTION OF THE CHILDREN IN THE PUBLIC SCHOOLS OF CONNECTICUT IN 1903, BY AGE AND BY GRADE

| Age | Grades | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Kg. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | All Grades | |
| 3 and 4 | 2,220 | 834 | 16 | 1 | | | | | | | | | | | 3,071 | 3–4 |
| 5 | 3,337 | 5,330 | 176 | 17 | | | | | | | | | | | 8,860 | 5 |
| 6 | 1,229 | 9,521 | 1,782 | 180 | 33 | 2 | | | | | | | | | 12,747 | 6 |
| 7 | 302 | 6,743 | 5,456 | 1,520 | 225 | 12 | 2 | | 1 | | | | | | 14,261 | 7 |
| 8 | 45 | 3,044 | 5,481 | 4,620 | 1,470 | 238 | 47 | 2 | 1 | | 1 | | | | 14 949 | 8 |
| 9 | 17 | 968 | 3,109 | 4,929 | 3,828 | 1,182 | 287 | 51 | 11 | 4 | 1 | | | | 14,387 | 9 |
| 10 | 9 | 442 | 1,389 | 3,293 | 4,433 | 3,200 | 1,227 | 237 | 48 | 4 | 1 | | | | 14,283 | 10 |
| 11 | 4 | 194 | 541 | 1,644 | 3,157 | 3,691 | 2,592 | 1,076 | 259 | 44 | 7 | 2 | | | 13,211 | 11 |
| 12 | 3 | 98 | 290 | 849 | 1,981 | 3,011 | 3,228 | 2,247 | 985 | 243 | 96 | 6 | | | 13,037 | 12 |
| 13 | 2 | 92 | 150 | 420 | 1,100 | 1,976 | 2,680 | 2,858 | 1,868 | 829 | 283 | 47 | 1 | | 12,306 | 13 |
| 14 | 1 | 18 | 48 | 113 | 291 | 600 | 1,085 | 1,582 | 1,920 | 1,239 | 665 | 189 | 25 | 2 | 7,778 | 14 |
| 15 | 1 | 5 | 9 | 25 | 67 | 114 | 293 | 597 | 998 | 901 | 752 | 445 | 192 | 15 | 4,414 | 15 |
| 16 | | | 1 | 3 | 12 | 21 | 56 | 141 | 327 | 450 | 599 | 554 | 328 | 76 | 2,568 | 16 |
| 17 | | | 1 | 1 | 2 | 8 | 10 | 25 | 67 | 127 | 301 | 367 | 430 | 158 | 1,497 | 17 |
| 18 | | | | | | 1 | 2 | 2 | 10 | 31 | 79 | 173 | 287 | 186 | 771 | 18 |
| 19 and over | | | | | 1 | | | | 1 | 7 | 15 | 54 | 95 | 108 | 281 | 19+ |
| All Ages | 7,170 | 27,289 | 18,449 | 17,615 | 16,600 | 14,056 | 11,509 | 8,818 | 6,496 | 3,879 | 2,800 | 1,837 | 1,358 | 545 | | |

The variability of age within the same grade is seen more clearly in Table 2, in which the percentages of each grade at each age are given, with the extreme and infrequent ages omitted.

One special feature of the variability shown by an age-grade table is the existence and amount of what has been called "retardation"—that is, of *old* children in *early* grades. If we call the "normal" age that a child should be in grade 1, six, in grade 2, seven, and so on, and call children who are below this so-called normal age for their grade, "Retarded," then in Connecticut in 1903 two-thirds of the children in grades 3, 4, and 5 were retarded a year or more. The recent agitation about such so-called retardation dates from the exploitation of this feature of the age-grade tables of certain cities, to which public attention was called by Bryan ['07] Cornman ['08] and Thorndike ['08], and which was later made the subject of a vigorous propaganda by Ayres ['09].

The next important fact shown by the age-grade table is the age at which pupils leave school. Looking down the "Total" column at the right of Table 1, one sees that, beginning at eleven years, the number of pupils of any year-age diminishes. Supposing the population of the state to have been such that the number of children who entered school was the same during each year from 1890 to 1903, and disregarding the transfer to and from private schools, it appears that nearly half of the children left school before they were fourteen, and nearly five-sixths before they were sixteen. These figures would have to be corrected somewhat elaborately for the growth of population in the state, for the death rate during these ages, for the date at which the census was taken, for the private-school transfers and for other influences, before an estimate of the expectation of school life for a Connecticut child could be made accurately. But they would give the first raw material for such an estimate, and from such enrollments distributed as to age, the first calculation of the actual age-retention and elimination in American cities was made in 1908.

TABLE 2

THE DISTRIBUTION OF THE ENROLLMENT OF EACH GRADE BY AGE. ON A BASIS OF 1,000 FOR EACH GRADE. CONN., 1903

| Age | Grades | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Kg. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | |
| 3 and 4 | 310 | 31 | | | | | | | | | | | | | 3–4 |
| 5 | 465 | 195 | 10 | | | | | | | | | | | | 5 |
| 6 | 171 | 349 | 96 | 10 | | | | | | | | | | | 6 |
| 7 | 42 | 247 | 295 | 86 | 14 | | | | | | | | | | 7 |
| 8 | 6 | 112 | 296 | 263 | 89 | 17 | 4 | | | | | | | | 8 |
| 9 | | 35 | 168 | 280 | 231 | 84 | 25 | 6 | | | | | | | 9 |
| 10 | | 16 | 75 | 187 | 267 | 228 | 107 | 27 | 7 | | | | | | 10 |
| 11 | | 7 | 29 | 93 | 190 | 263 | 225 | 122 | 40 | 11 | | | | | 11 |
| 12 | | | 16 | 48 | 119 | 214 | 281 | 255 | 152 | 63 | 34 | | | | 12 |
| 13 | | | 8 | 24 | 66 | 140 | 233 | 324 | 288 | 214 | 101 | 26 | | | 13 |
| 14 | | | | 6 | 18 | 43 | 94 | 179 | 296 | 319 | 238 | 103 | 18 | 4 | 14 |
| 15 | | | | | 4 | 8 | 25 | 68 | 154 | 232 | 269 | 242 | 141 | 28 | 15 |
| 16 | | | | | | | 5 | 16 | 50 | 116 | 214 | 302 | 241 | 140 | 16 |
| 17 | | | | | | | | 3 | 10 | 33 | 108 | 200 | 316 | 290 | 17 |
| 18 | | | | | | | | | | 8 | 28 | 94 | 211 | 341 | 18 |
| 19 and over | | | | | | | | | | | 5 | 29 | 70 | 298 | 19+ |
| All ages | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | |

Such an age-grade table also gives the most convenient approximate estimate of the number of children beginning school per year. This important fact, which we may call the *educational birth rate*, is almost never reported from direct measurements. The number at age 8 or the number at age 9 is found to be, over a series of years, a fair rough measure of it.

Such an age-grade table gives data from which, with the aid of other facts, the degree of education, measured by the grade reached before leaving school, may be calculated for the children of a community. This retention to, or elimination at, a given grade is, in many ways, more important than retention to, or elimination by, a given age.

Looking along the horizontal row of totals, one sees that the numbers drop, there being about half as many in the ninth grade as in the seventh, and about half as many in the eleventh as in the ninth. If population were stationary, if repeating and skipping were each as frequent in any one grade as in all others, and if certain other minor conditions were fulfilled, the drop in the figures from one grade to the next would measure the elimination of pupils at that point. As will be shown later, the expectation that a child of any given school system will continue to any given grade can be calculated by a study of the age-grade table in connection with changes in population, the frequency of skipping and repeating in each grade and other facts.

It is worth while to note that the fact recorded—of half as many children again in the first as in the second or third grade—is a common and somewhat curious feature of school statistics. This enormously greater reputed enrollment in grade 1 than in any other grade does not, of course, mean that half of the children in Connecticut did not get beyond grade 1. It means in part that many more children repeated grade 1 than later grades, in part that almost no children skipped grade 1. But it also probably means certain possible errors of the recording officers. The

enrollment statistics of grade 1 are in general much less reliable than those of later grades. For instance, one should, when the frequency of non-promotion in each grade is given, be able to get approximately the enrollment of grade 1, by adding to that of grade 2, the excess of repeating and the deficiency of skipping in grade 1 as compared with grade 2. But often the recorded enrollment is far above the result so obtained.

Finally, an age-grade table tells something about the kind of pupil who is eliminated from school in an early grade. For example, start in Table 1 with the thirteen-year-olds who are in grades 2, 3, 4 and 5 on the the one hand, and in grades 7, 8, 9 and 10 on the other. Comparing the thirteen-year-olds in grades 2, 3, 4 and 5 with the fourteen-year-olds in grades 3, 4, 5 and 6, we find a drop to 57.2 per cent, or a difference of 43 per cent. Comparing the thirteen-year-olds in grades 7, 8, 9 and 10 with the fourteen-year-olds in grades 8, 9, 10 and 11, we find a drop to only 68.7 per cent, or a difference of only 31 per cent.

Similarly between fifteen-year-olds in grades 2, 3, 4 and 5 and sixteen-year-olds in grades 3, 4, 5 and 6, there is a drop to 42.8 per cent, or a difference of 57.2 per cent; while between fifteen-year-olds in grades 7, 8, 9 and 10 and sixteen-year-olds in grades 8, 9, 10 and 11 there is a drop to only 59.4 per cent, or a difference of only 30.6 per cent. In general, *at a given age the "retarded" pupils are much more often eliminated.* Further study would show that this means that at any age the pupils of less interest in, or ability at, scholarship are more often eliminated.

## § 2. The Elimination of Pupils from School [1]

### *Introduction*

What pupils stay in school, how long they stay, what grades they reach, and why they leave, are questions of obvious significance for any educational system. The facts concerning them decide in great measure the service performed by the system. A system in which laziness and stupidity eliminate pupils is better than one in which they are eliminated by poverty. A system which holds 60 out of 100 till the eighth grade is presumably better or more fortunate than one which holds only 20. If two systems keep pupils in school equally long so far as years go, and one of the two systems gets 15 out of 100 through the high school while the other gets only 5, the latter system is probably somewhere guilty of waste.

The facts really needed for an adequate study of these general questions are the educational histories of 500 to 1,000 children (chosen at random from the 6 to 8-year-olds) in each of 20 or 30 communities, each of the individual histories to cover at least the years from 8 to 18. If these histories were studied in connection with the characteristics of each community's educational endeavor, and in connection also with the economic, social, and intellectual environment of the individuals concerned, we could know exactly the general tendency of elimination in this country, the variability of different communities in respect to it, the causes of these variations, and at least some of the ways to keep more of the children and more of the worthy children in school.

[1] The text of § 2 is composed in the main of quotations from a monograph with the same title by E. L. Thorndike which appeared in 1908 as Bulletin No. 4, 1907, Whole Number 379, of the U. S. Bureau of Education.

For four years the author has been gathering and studying such data as he could obtain from printed reports and the like concerning various aspects of the general question, in the hope of eventually making specific studies in some cities with data of the desirable sort just described, and so being able to interpret the facts already given in print. It has proved impracticable for him to obtain these educational life histories of individuals. It therefore seems best to report briefly the facts at hand, in the hope that others may be encouraged to secure and study the more important individual histories.

The facts at the basis of this report are:

(1) Registration statistics by grade in elementary and high schools.

(2) Registration statistics by age in elementary and high schools.

(3) Registration statistics by grade and sex in high schools.

(4) Registration statistics by age and sex in high schools.

(5) Registration statistics by grade in colleges.

Such facts are instructive, provided one uses them with full cognizance of their meaning and likelihood of error. Otherwise they may be seriously misleading. For example, the registration for grades 5 to 8 in Springfield for 1903 was as follows:

| | | | |
|---|---|---|---|
| Grade 5 | 1,072 | Grade 7 | 799 |
| Grade 6 | 986 | Grade 8 | 633 |

This does not mean that of 1,072 pupils in the fifth grade 633 will remain on till the eighth; for it to mean that, there must be a stationary school population. The eighth grade in 1903 should be compared not with the lower grades of 1903, but with the fifth grade of 1900, the sixth grade of 1901, and the seventh grade of 1902. Doing this, we get (instead of 1,072, 986, 799, and 633) 904, 892, 768, and 633.

But these figures, though far nearer the truth, are by no means necessarily a true measure of the retention of the fifth grade pupils of 1900; for some of these 904 pupils of 1900 undoubtedly were held back two years in some grade and yet are staying on in school and will be in the eighth grade, but in 1904; conversely with some promoted rapidly. Also, some may have stayed out of school for a year or more and then reëntered. Also, if 1,000 families, each with a child of about 13, moved to Springfield in 1902, the 633 of the 1903 eighth grade would not represent those remaining from the 904 of the 1900 fifth grade; in fact, conceivably, not one of them might be left in school, the 633 being entirely composed of the children of these new families.

In the second place, a true estimate of elimination requires not only public school statistics, but also measurements of the interchange between public and private schools. Luckily, this correction is in most American cities of little account.

My report for education below the colleges is based on data from public schools only. My estimates concern the school careers of children entering the public schools of cities of this class. Those who leave to enter private schools are probably balanced by those who enter later grades from the parochial and other private schools. The interchange between public and private schools may be, however, of varying influence in different cities, and unless we can estimate it accurately for each our comparison of individual cities will be to some extent in error.

In the third place, if we are to make statements concerning individual educational systems, such as individual cities, without risk of being unjust, we need figures from enough years to give a result precise enough to prevent rating any one city above any other when in the long run it would belong below it. Data that give a precise notion of the general tendency of all urban communities together may give a very rough approximation for any single city.

### *Elimination by Ages: Results*

My study concerns 8-year-olds (1) of large cities, (2) in the public schools, and (3) in the case of cities where separate schools for the colored race are maintained, of the white children only. The data are, roughly, for the period from 1890 to 1900. I also do not count elimination by death. Such being the conditions, I estimate that of one hundred 8-year-olds living long enough, the number retained till any given age is as follows:

*Percentage of 8-year-olds retained*

| | Percentage. | | Percentage. |
|---|---|---|---|
| 10 years old | 100 | 15 years old | 47 |
| 11 years old | 98 | 16 years old | 30 |
| 12 years old | 97 | 17 years old | 16.5 |
| 13 years old | 88 | 18 years old | 8.6 |
| 14 years old | 70 | | |

Figure 1 shows the amount of elimination with respect to age at a glance.

These figures give the proof of the provision in regular day schools for boys and girls who, in England and Germany, have to be at work with only scanty schooling in special classes. They show the readiness of a large proportion, almost a majority, of parents to neglect the opportunity to withdraw their children at the legal age limit. They also show the very considerable number of the violations of the law, a number which would probably be somewhat increased if false reports of age were not present. The legal age limit has evidently a less effect than we have been in the habit of supposing. Its service is now to prevent the folly of a minority of families rather than to set a standard for the community as a whole.

The importance of the fact that pupils stay so long and yet progress only to so low grades [1] has been recognized by wise

[1] For the period for which this estimate of elimination by age was made, the elimination by grades was estimated as such that the general tendency of Amer-

administrative officers. It means, of course, that many pupils are held back unduly, or that the work which they are given to do but fail to do is unsuited to them. Rapid-promotion systems, special classes, careful regulation of promotion, the substitution of industrial and trade schools or courses for the regular school,

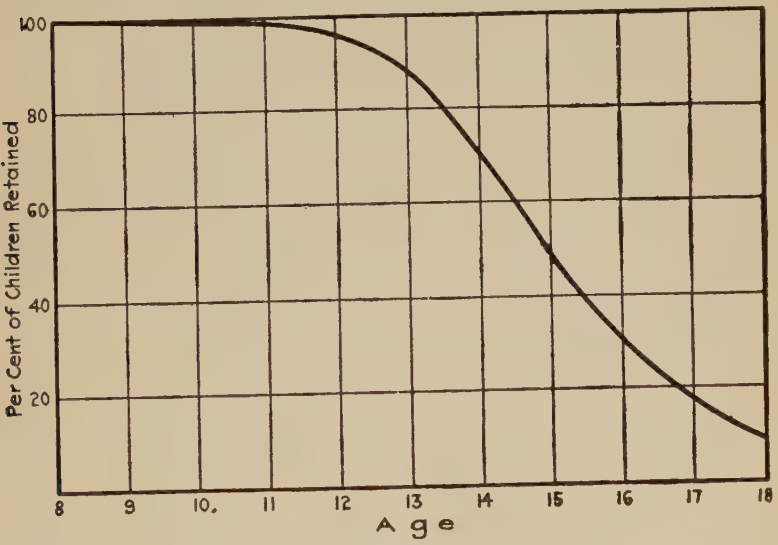



FIG. 1. Amount of elimination with respect to age.

and the like will be used by efficient school officers to make retention to a late age mean also retention to a valuable education.

At the first sight it seems strange that so many pupils should

ican cities of 25,000 and over was to keep in school out of 100 entering pupils (here, and throughout the report, unless the contrary is specially stated, "children" or "pupils" includes white pupils only, in cities where colored pupils are taught in separate schools) who lived long enough to complete the course, 90 till grade 4, 81 till grade 5, 68 till grade 6, 54 till grade 7, 40 till the last grammar grade (usually the eighth, but sometimes the ninth, and rarely the seventh), 27 till the first high-school grade, 17 till the second, 12 till the third, and 8 till the fourth. Figure 2 shows graphically this general tendency.

stay in school till 10, 11, 12, 13, and 14, and so few till the fourth, fifth, sixth, and seventh and eighth grades. How, for instance, can we have 97 per cent of the 8-year-olds staying till they are 12, but only 68 per cent of those in the second grade staying till the sixth grade?

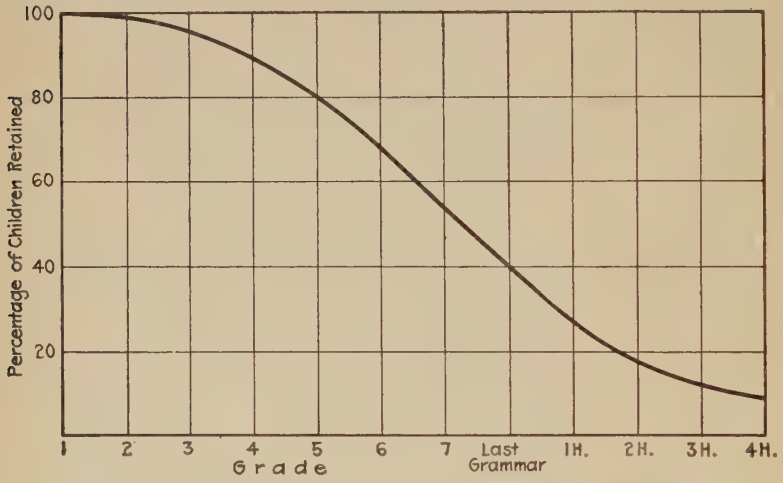



FIG. 2. Amount of elimination with respect to grade reached.

The main cause of this fact is that the elimination of pupils in any grade, but specially in the lower ones, is largely of older pupils. If we recall, for instance, the fact that in the sixth school grade in Connecticut in 1903 as many pupils were 13 or over as were under 12, we may understand that the 32 per cent of elimination before the sixth grade could take place largely at the expense of children 13 or more years old.

I have calculated what would be the grade retention if the age retention were 1,000 7 years old, 1,000 8 years old, 1,000 9 years old, 998 10 years old, 980 11 years old, 970 12 years old, 880 13 years old, 700 14 years old, 470 15 years old, 300 16 years old, 165 17 years old, and 86 18 years old (with the proper number 5

and 6 years old added), on the hypothesis that the per cents of children of given ages in the different grades is as found in the 1903 Connecticut report. The resulting figures are close to those obtained by my own study. The study of the age retention thus really verifies the approximate accuracy of the results of the study of grade retention.

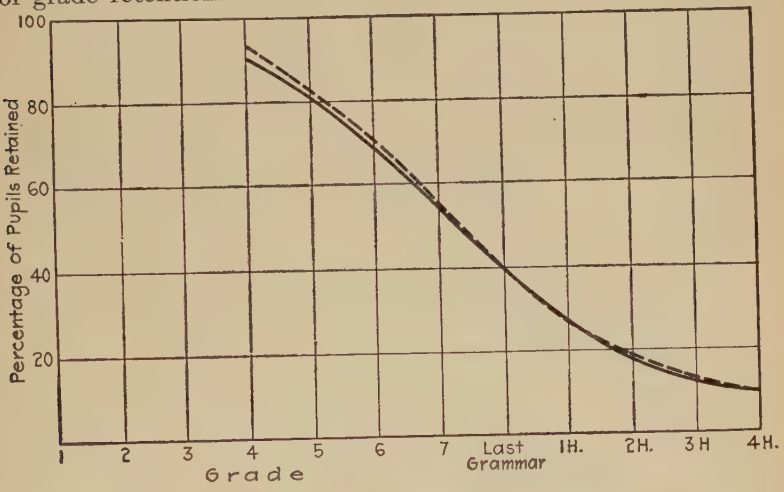



FIG. 3. Verification of the approximate accuracy of the estimate of elimination by grade reached shown in Fig. 2. The dotted line shows the retention in the different grades (4 to 4 H. S.) as calculated on the basis of the age retention stated in the text and the age-grade distribution found in Connecticut in 1903. The continuous line shows the retention in the different grades as stated in the text.

The essential facts are given in Figure 3 and the legend beneath it.

### *Elimination by Ages: Methods: The Original Data of Age Populations*

Table 3 gives a sample of such data as I gathered concerning the number of pupils of each year-age in the public schools of 25 cities.

TABLE 3

THE DISTRIBUTION BY AGE OF PUPILS IN THE PUBLIC DAY SCHOOLS (ELEMENTARY AND SECONDARY) OF THREE CITIES

| | AGE | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Baltimore: | | | | | | | | | | | | | |
| 1897 | 6,953 | 7,573 | 7,610 | 7,537 | 7,113 | 6,817 | 5,486 | 3,876 | 2,406 | 1,230 | 642 | 299 | 99 |
| 1898 | 7,325 | 7,369 | 7,788 | 7,757 | 7,099 | 6,889 | 5,471 | 3,751 | 2,392 | 1,274 | 602 | 289 | 96 |
| 1901 | 7,132 | 7,710 | 7,793 | 8,086 | 7,371 | 6,755 | 5,519 | 3,810 | 2,284 | 1,109 | 556 | 264 | 123 |
| Boston: | | | | | | | | | | | | | |
| 1894 | 6,139 | 6,503 | 6,224 | 6,298 | 5,825 | 5,992 | 5,808 | 4,707 | 3,308 | 2,053 | 1,121 | 571 | *a*200 |
| 1896 | 6,398 | 6,520 | 6,665 | 6,432 | 6,100 | 6,045 | 5,744 | 4,787 | 3,383 | 2,052 | 1,113 | 628 | *a*236 |
| 1897 | 6,569 | 6,692 | 6,807 | 6,733 | 6,178 | 6,244 | 5,890 | 3,909 | 3,563 | 2,261 | 1,221 | 621 | *a*248 |
| 1903 | 8,233 | 8,170 | 7,916 | 8,035 | 7,669 | 7,601 | 7,068 | 5,568 | 3,636 | 2,352 | 1,378 | 687 | *a*234 |
| Cleveland: | | | | | | | | | | | | | |
| 1895 | 5,530 | 5,630 | 5,258 | 5,333 | 4,743 | 4,562 | 3,920 | 2,980 | 1,648 | 976 | 635 | ..... | ..... |
| 1896 | 5,957 | 5,953 | 5,443 | 5,493 | 4,725 | 4,882 | 4,260 | 3,092 | 1,717 | 980 | 580 | ..... | ..... |
| 1897 | 6,277 | 6,096 | 5,670 | 5,509 | 4,865 | 5,081 | 4,819 | 3,157 | 1,646 | 1,002 | 650 | ..... | ..... |
| 1898 | 6,421 | 6,325 | 5,860 | 5,543 | 5,149 | 5,178 | 4,937 | 3,428 | 1,864 | 1,068 | 645 | ..... | ..... |
| 1900 | 7,067 | 6,878 | 6,242 | 5,982 | 5,251 | 5,440 | 4,935 | 3,732 | 2,006 | 1,093 | 674 | ..... | ..... |
| 1901 | 7,096 | 6,961 | 6,618 | 6,191 | 5,599 | 5,561 | 4,794 | 3,740 | 1,988 | 1,058 | 607 | ..... | ..... |
| 1902 | 7,030 | 7,208 | 6,723 | 6,639 | 5,763 | 5,693 | 4,973 | 3,497 | 1,946 | 1,086 | 635 | ..... | ..... |
| 1904 | 7,572 | 7,694 | 7,229 | 7,238 | 6,555 | 6,705 | 6,011 | 3,839 | 3,027 | 1,085 | 768 | ..... | ..... |

*a* Approximate.

Table 4 gives the facts for ages of 10 and over in percentages on the number of 7, 8, and 9-year-olds divided by 3, which is practically the same as the number of 8-year-olds, a single set of such percentages being calculated from all the records together for any city.

TABLE 4

THE PER CENTS WHICH THE 10-YEAR-OLDS, 11-YEAR-OLDS, ETC., IN SCHOOL, ARE OF THE NUMBER OF 8-YEAR-OLDS APPROXIMATELY, BY GIVING THE PER CENTS WHICH THEY ARE OF THE SUM OF THE 7, 8, and 9-YEAR-OLDS DIVIDED BY 3. (25 CITIES)

| | Age | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Years reported* | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Baltimore | 1897, 1898, 1901 | 104.0 | 96.4 | 91.3 | 73.3 | 50.9 | 31.6 | 16.1 | 8.0 | 3.8 | 1.0 |
| Boston | 1894, 1896, 1897 1903. | 99.6 | 93.4 | 93.6 | 88.8 | 72.4 | 50.3 | 31.6 | 17.5 | 9.1 | *a*3.3 |
| Cleveland | 1895, 1896, 1897 1898, 1900, 1901 1902, 1904 | 93.3 | 82.3 | 83.4 | 73.4 | 54.0 | 29.3 | 16.4 | 10.1 | ..... | ..... |
| Chicago | 1900, 1901 | 90.4 | 83.5 | 79.8 | 67.9 | 65.3 | 31.4 | 19.7 | ..... | ..... | ..... |
| Columbus, Ohio | 1899, 1902 | 98.3 | 88.5 | 91.7 | 86.1 | 73.1 | 51.2 | 35.0 | 21.4 | 10.4 | 3.9 |
| Dayton | 1900, 1901 | 97.2 | 91.2 | 88.9 | 85.3 | 64.7 | 39.4 | 25.2 | 17.6 | 11.8 | 8.1 |
| Denver | 1897, 1898, 1899 1900, 1901. | 98.7 | 91.8 | 90.4 | 81.8 | 73.8 | 59.9 | 44.1 | 28.9 | 18.2 | 9.0 |
| Fitchburg | 1901 | 84.4 | 86.7 | 84.4 | 93.1 | 51.5 | 42.6 | 29.2 | 14.6 | 6.2 | 1.0 |
| Grand Rapids | 1899, 1901, 1903 1904. | 102.0 | 95.6 | 94.2 | 93.2 | 85.3 | 71.9 | 42.7 | 21.5 | 14.6 | 7.3 |
| Jersey City | 1897, 1898, 1899 | 97.0 | 90.0 | 89.1 | 76.2 | 55.0 | 33.7 | 13.0 | 4.5 | 2.1 | 0.8 |
| Johnstown | 1903 | 107.0 | 99.7 | 86.6 | 88.9 | 62.8 | 40.3 | 19.1 | 9.2 | 6.3 | 2.3 |
| Kansas City, Kans. | 1900, 1901 | 106.4 | 101.5 | 99.1 | 88.4 | 74.9 | 54.8 | 38.4 | 25.5 | 12.8 | 4.8 |
| Kansas City, Mo. | 1900, 1901 | 102.1 | 92.4 | 91.1 | 83.5 | 71.0 | 57.0 | 38.3 | 24.1 | 13.6 | 5.3 |
| Little Rock | 1895, 1896 | 101.6 | 100.0 | 95.4 | 86.3 | 77.3 | 57.5 | 36.7 | 16.6 | 8.2 | 2.3 |
| Los Angeles | 1899, 1900, 1901 | 101.4 | 91.9 | 89.8 | 77.7 | 67.9 | 49.1 | 31.8 | 19.2 | 10.1 | 8.9 |
| Louisville | 1896, 1898 | 93.5 | 80.9 | 85.3 | 74.1 | 53.6 | 42.1 | 19.3 | 12.7 | 6.9 | 2.8 |
| Minneapolis | 1898, 1900, 1902 1904. | 98.8 | 91.8 | 91.0 | 81.8 | 70.0 | 50.6 | 39.5 | 19.8 | 11.3 | 5.0 |
| Newark | 1901, 1902, 1903 | 94.0 | 83.8 | 80.4 | 59.7 | 35.7 | 18.7 | 10.4 | 5.2 | 2.8 | 1.6 |
| New Orleans | 1901, 1902 | 99.3 | 88.3 | 84.6 | 70.0 | *a*51.3 | *a*23.2 | *a*13.4 | *a*8.2 | *a*3.4 | *a*2.3 |
| Omaha | 1898, 1899 | 89.8 | 79.7 | 81.8 | 74.7 | 59.2 | 42.8 | 27.2 | 14.7 | 6.6 | 2.8 |
| Springfield, Mass. | 1899, 1900, 1901 1902, 1903. | 91.0 | 88.9 | 87.0 | 85.0 | 76.3 | 58.5 | 39.0 | 24.1 | 14.5 | 6.9 |
| St. Joseph | 1901, 1892 | 11.5 | 92.5 | 78.1 | 72.3 | 56.4 | 48.8 | ..... | ..... | ..... | ..... |
| St. Paul | 1893 | 87.4 | 73.7 | 74.2 | 61.9 | 54.3 | 35.8 | 26.2 | 10.3 | 7.7 | 3.4 |
| Toledo | 1894, 1899 | 85.3 | 74.6 | 76.3 | 67.6 | 58.8 | 37.6 | 21.5 | 10.8 | 4.1 | 1.7 |
| Troy | 1891, 1895, 1896 | 12.0 | 92.5 | 100.0 | 79.0 | 63.9 | 35.7 | 20.1 | 12.6 | 7.6 | 4.8 |
| Medians | ..... | 98.7 | 91.2 | 88.9 | 79.0 | 63.9 | 42.6 | 26.7 | 15.0 | 7.8 | 3.4 |

*a* Approximate

## *The Reliability of Age Data from a Few Years as Representative of the General Tendencies of Cities*

The general tendency of a city as shown in a long series of years is of course only approximately represented by the figures of Table 4 calculated from only a few years' statistics.

The closeness of the approximation can be calculated by well known formulæ based on the theory of probability. I have, to this end, calculated the percentages of 10, 11, 12, etc., year-olds on $\frac{7+8+9 \text{ year-olds}}{3}$ for each year's record from Springfield (five years), Minneapolis (four years), Cleveland (eight years), and Dayton (two years); and, from these individual-year percentages, have calculated the probable closeness of the approximation for a record from one year only, for a record from two years, etc. The chances are even that the results obtained for 10-year-olds will not diverge from the true per cents by more than—

1.7 per cent of the per cent obtained, one year's records being used.
1.2 per cent of the per cent obtained, two years' records being used.
1.0 per cent of the per cent obtained, three years' records being used.
.8 per cent of the per cent obtained, four years' records being used.
.8 per cent of the per cent obtained, five years' records being used.

For other ages the corresponding figures are obtained by dividing a given constant, computed for each age, by the square root of the number of years' records used. The value of the constant for each age is as follows:

| | Value of constant | | Value of constant |
|---|---|---|---|
| 11-year-olds | 1.9 | 15-year-olds | 4.8 |
| 12-year-olds | 2.6 | 16-year-olds | 5.3 |
| 13-year-olds | 3.5 | 17-year-olds | 5.7 |
| 14-year-olds | 4.1 | | |

To get the figures such that the chances are 99 to 1 against greater divergence, multiply the figures for even chances by $3\frac{3}{4}$.

For example, the obtained result from Denver for 16-year-olds is 44.1 calculated from five years' records. The chances are even that the true per cent for Denver 16-year-olds will not diverge from 44.1 by more than $\frac{5.3}{\sqrt{5}}$ per cent of 44.1, or 1.1. That is,

the chances are even that the true per cent will lie between 43 and 45.2.

The chances are even that the medians calculated from these 25 cities will not diverge from the medians of the entire group of cities from which these are a random sampling by more than the following per cents for the different ages:

| | Per cent | | Per cent |
|---|---|---|---|
| 10-year-olds | 0.85 | 15-year-olds | 1.8 |
| 11-year-olds | .9 | 16-year-olds | 1.8 |
| 12-year-olds | .75 | 17-year-olds | 1.1 |
| 13-year-olds | 1.35 | 18-year-olds | .55 |
| 14-year-olds | 1.8 | 19-year-olds | .3 |

### *The Process of Estimating Actual Elimination from the Facts of School Age Populations*

The figures of Tables 3 and 4, obtained from the contemporaneous age populations, need to be viewed in the light of the fact that in these cities the number of children 10, or 11, or 12, years old is not the same as the number of 8-year-olds. Just what the ratios are in each city is not known, nor are the ratios for the cities as a group known more than approximately. An accurate census by year ages is needed for this. By the natural "birth-rate minus death-rate" increase, there are, in the entire country, for every 1,324 from 5 to 9, 1,175 from 10 to 14, and 1,057 from 15 to 19 (Abstract of 12th Census, p. 12); that is, 88.7 and 79.8 per cent, respectively. In the cities as a group, this condition holds approximately for the 10 to 14 group, but not at all for the 15 to 19 group, the 1890 and the 1900 censuses giving, for the corresponding percentages, approximately 91 and 96. These differences are due to a very slight degree probably to differences between the urban and the general birth rate, and to a large degree to the fact that inter-migration of city and country children gives the cities more boys and girls from 10 to 14, and many more from 15 to 19, than it removes. Individual cities vary very widely from

the general tendency of the group, some cities having as many children 10 to 14 as 5 to 9, and others only 80 per cent as many. The variation in the ratio which the number of children 15 to 19 bears to the number 5 to 9 is still more variable. I shall not, in general, try to estimate the number of children at each year age in each city,but shall do so only for each age group as a whole.

Using the data given in the census reports for 1890 and 1900, I find that the median per cent which the ten to fourteen-year-olds were of the 5 to 9-year-olds in the cities of Table 4 was 94 in 1890, and 88 in 1900. The median per cent which the 15 to 19-year-olds were of the 5 to 9-year-olds in these cities was 99 in 1890.

We may then fairly take the percentages which the numbers of inhabitants of each age from 10 on are to the number of 7, 8, and 9-year-olds divided by 3 as:

| | Percentage | | Percentage |
|---|---|---|---|
| 10 years old | 96 | 15 years old | 90 |
| 11 years old | 94 | 16 years old | 92 |
| 12 years old | 92 | 17 years old | 98 |
| 13 years old | 90 | 18 years old | 102 |
| 14 years old | 89 | | |

We might then, to get for the group the per cent of the children of each age that are in school, divide through the figures representing the central tendency of cities for ages 10, 11, 12, etc., in order, by 0.96, 0.94, 0.92, etc.,—that is, divide the 98.7 of Table 4 by 0.96, the 91.2 by 0.94, the 88.9 by 0.92, and so on. The figures thus obtained would not, however, be truly significant for the years from 14 on, for the reason that among the 15 to 19-year-olds migrating to the city, very many *have already been eliminated* from school in the country, and come to the city specifically to work. We should have in our result a measure, not of the elimination in cities, but of the elimination in cities plus the nature of the selection by cities from other localities. On the other hand, to take ratios based exclusively on the "birth-rate minus death-rate" increase, whereby the 15 to 19-year-olds are only 79.8 per

cent of the 5 to 9-year-olds, would be unfair, for the reason that many families move to the city so that older children can have the advantage of the high school; moreover some of the pupils counted in the city school populations, especially in the late years, come in daily from the surrounding country. Though perhaps nine out of ten of the "15 to 19 increase by immigration" come to the cities to work, a few come specifically to go to school.

On the whole, in order to compare the numbers actually in school with the numbers that would be if every child in the cities who is in school at 8 years of age, kept on in school till he was 19 (except for death), and if no one moved away from, or moved into, the cities, we may fairly balance the results of death and of immigration on the school age population records after 14, and regard the per cents with which the 98.7, 91.2, 88.9, etc., of Table 4 should be compared as follows:

*School expectation if no elimination existed*

| | Percentage | | Percentage |
|---|---|---|---|
| 10 years old | 96 | 15 years old | 90 |
| 11 years old | 94 | 16 years old | 90 |
| 12 years old | 92 | 17 years old | 90 |
| 13 years old | 90 | 18 years old | 90 |
| 14 years old | 90 | | |

The percentages retained then rise from 98.7, 91.2, 88.9, etc., and become—

*Percentage of* $\frac{7+8+9}{3}$ *retained*

| | Percentage | | Percentage |
|---|---|---|---|
| 10 years old | 103.0 | 15 years old | 47.0 |
| 11 years old | 97.0 | 16 years old | 30.0 |
| 12 years old | 97.0 | 17 years old | 16.5 |
| 13 years old | 88.0 | 18 years old | 8.6 |
| 14 years old | 70.0 | | |

The absurdity of the 103 per cent is probably due to the tendency of the children to state their age as 10 if it is 9 or 11, more

often than to state it as 9 if it is 8 or 10, or as 11 if it is 10 or 12; and perhaps to the late entry to the public schools of a few children. We may properly correct for this, making the percentage of $\frac{7+8+9}{3}$ retained as follows:

*Corrected percentage of* $\frac{7+8+9}{3}$ *retained*

| | Percentage | | Percentage |
|---|---|---|---|
| 10 years old | 100.0 | 15 years old | 47.0 |
| 11 years old | 98.0 | 16 years old | 30.0 |
| 12 years old | 97.0 | 17 years old | 16.5 |
| 13 years old | 88.0 | 18 years old | 8.6 |
| 14 years old | 70.0 | | |

These figures represent as good an approximation to the retention of children in city public schools, such as those listed, at the year 1900, as I can get from the data at hand without elaborate hypotheses for correction. It is certainly not far from the truth to say that of pupils entering these city schools one-tenth leave before 13 years of age, one-fourth before 14, one-half before 15, two-thirds before 16, and five-sixths before 17.

The reader will understand that these figures for cities may be much too high for the country at large. Even in Connecticut, a State fortunate in its means of education, the corresponding figures [1] are—

| | Percentage | | Percentage |
|---|---|---|---|
| 10 years old | 99.5 | 15 years old | 32.0 |
| 11 years old | 94.0 | 16 years old | 19.0 |
| 12 years old | 94.0 | 17 years old | 11.0 |
| 13 years old | 91.0 | 18 years old | 6.0 |
| 14 years old | 57.0 | | |

*The Variability Among Cities with Respect to Elimination by Age*

The student who is desirous of a strict account of the variabil-

[1] From the 1903 report of the State Board of Education, pp. 184–185, reduced to per cents of the number of 8-year-olds and corrected by the population statistics of the census of 1900.

ity of cities in respect to elimination by age may, by using the data given by Thorndike ['08, Tables 17 and 19], and such other data as he may secure from city reports, correct each city's school population statistics separately and then compare them. I shall do this only for three high and three low ranking cities and without attempt at perfect precision.

The age population percentages for Cleveland,[1] Jersey City, and Newark schools, as given in Table 4, are:—

| CITY | AGE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* | *Per ct.* |
| Cleveland | 93.3 | 82.3 | 83.4 | 73.4 | 54.0 | 29.3 | 16.4 | 10.1 | ..... |
| Jersey City | 97.0 | 91.0 | 89.0 | 76.2 | 55.0 | 33.7 | 13.0 | 4.5 | 2.1 |
| Newark | 94.0 | 83.8 | 80.4 | 59.7 | 35.7 | 18.7 | 10.4 | 5.2 | 2.8 |
| Average[a] | 94.8 | 85.7 | 84.3 | 69.8 | 48.2 | 27.2 | 13.3 | 6.6 | 4.0 |
| Median | 94.0 | 83.8 | 83.4 | 73.4 | 54.0 | 29.3 | 13.0 | 5.2 | 2.8 |

*a* Approximate

Those for Denver, Grand Rapids, and Springfield are:—

| CITY | AGE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| Denver | 98.7 | 91.8 | 90.4 | 81.8 | 73.8 | 59.9 | 44.1 | 28.9 | 18.0 |
| Grand Rapids | 102.0 | 95.6 | 94.2 | 93.2 | 85.3 | 71.9 | 42.7 | 21.5 | 18.0 |
| Springfield | 91.0 | 88.9 | 87.0 | 85.0 | 76.3 | 58.5 | 39.0 | 24.1 | 13.6 |
| Average | 97.2 | 92.1 | 90.5 | 86.7 | 78.5 | 63.4 | 41.9 | 24.8 | 16.5 |
| Median | 98.7 | 91.8 | 90.4 | 85.0 | 76.3 | 59.9 | 42.7 | 14.1 | 14.6 |

The question is as to how far these extreme individual differences are due to differences in the rate of growth of the cities, and how far they are due to real differences in the educational character of the cities. The percentages which the number 10 to 14 and the number 15 to 19 are to the number 5 to 9 for those cities are:

[1] Baltimore makes a lower record than Cleveland, but as this may be due in large measure to the colored population it seemed better not to include it.

| CITY | AGE | | CITY | AGE | |
|---|---|---|---|---|---|
| | 10–14 | 15–19 | | 10-14 | 15-19 |
| Cleveland | 86.5 | 89.0 | Denver | 88.4 | 88.0 |
| Jersey City | 84.2 | 83.0 | Grand Rapids | 89.1 | 90.0 |
| Newark | 85.4 | 86.0 | Springfield | 86.1 | 90.0 |
| Average | 85.4 | 86.0 | Average | 87.9 | 89.3 |
| Median | 85.4 | 86.0 | Median | 88.4 | 90.0 |

It thus appears that the superiority of the record by age populations of the second group of cities is in a slight degree due to the fact that they have more children 10 to 18 to draw from, approximately 4 per cent more. If the age populations of the former group are multiplied each by 1.04, this disadvantage is removed. The difference thus made is very slight.

It is also true that Newark and Cleveland have flourishing private schools, which take from the public schools more old pupils than they return in exchange, and which eliminate a very small percentage of their pupils compared with the public school per cents. Springfield, Grand Rapids, and Denver do not have private schools of anywhere nearly so great influence on school attendance. Moreover, these latter cities probably gain more from the registration of out-of-town pupils in the high schools than do Jersey City and Newark. A liberal allowance for all these influences and others, except the nature of the pupils and of the school systems themselves, will be made by multiplying the figures for the former group by:

| | Multiplier | | Multiplier |
|---|---|---|---|
| 10 years old | 1.04 | 15 years old | 1.08 |
| 11 years old | 1.04 | 16 years old | 1.10 |
| 12 years old | 1.05 | 17 years old | 1.18 |
| 13 years old | 1.05 | 18 years old | 1.20 |
| 14 years old | 1.06 | | |

We have then the following:

| AGE | AVERAGE | | MEDIAN | |
|---|---|---|---|---|
| | Cleveland, etc. | Denver, etc. | Cleveland, etc. | Denver, etc. |
| 10 years | 99 | 97 | 98 | 99 |
| 11 years | 89 | 92 | 87 | 92 |
| 12 years | 89 | 91 | 88 | 90 |
| 13 years | 73 | 87 | 77 | 85 |
| 14 years | 51 | 79 | 57 | 76 |
| 15 years | 29 | 63 | 32 | 60 |
| 16 years | 14.5 | 42.0 | 14.3 | 42.7 |
| 17 years | 7.8 | 24.8 | 6.1 | 24.1 |
| 18 years | 4.8 | 15.4 | 3.4 | 14.6 |

The cities in the second list, after this allowance, still keep one and a half times as many to the age of 14, twice as many to 15, three times as many to 16, and three and a half times as many to 17 and 18.

## § 3. Promotion, Retardation, and Elimination [1]

It is, or should be, well known that in every administrative educational unit such as a city school system or a private secondary school, the fractions of the total course nominally to be completed in equal times,—for example, the "grades" of the elementary school, or the "years" of the secondary school,—may actually require unequal periods. This requirement of unequal periods in a given system is disclosed by the fact that a large percentage of the pupils spend more time in one grade than in another. Nevertheless, a year, or half year, as the case may be, is often unwisely assumed to be the normal time for all pupils and all grades alike.

It is worth while to find out the general tendency of the elementary or secondary schools in this country in this respect. If there is a *general* tendency affecting some particular grade or grades, the fact is of importance for three reasons. If there is a general tendency such as to make the completion of, say, the second grade in the "normal" unit of time a specially difficult task for the pupil who reaches it, it would probably be advisable to eliminate this tendency. Teachers, pupils, and parents would thereby comprehend more easily the work of the school and what is necessary to its satisfactory completion. If the inequality is not removed, its existence could at least be made known to teachers, pupils, and parents. A more precise knowledge of these inequalities will also help us to estimate the nature and amount

[1] For a complete account of the investigation, certain results of which are reported in this section, see the article by E. L. Thorndike with the same title, in "The Psychological Clinic, vol. III, pp. 232–243 and 255–265. This section quotes therefrom with omissions and minor alterations.

of the retardation of pupils in school, and the elimination of pupils from school.

I propose, therefore, to measure the extent to which the different grades of the elementary and high schools are, in American cities in general, of unequal length.

The most desirable material from which to calculate this measurement would be a sufficient number of individual educational histories, stating accurately how long each pupil took to complete grade 1, how long to complete grade 2, etc. Such life histories do not exist at all in published form, and only rarely in the written records of school officers, and could be secured in adequate number only at a cost for travel, time, and clerical assistance which is for the author prohibitive. The facts can be fairly well determined, however, from city school reports, from an examination of the not infrequent statements of the number of promotions by grades. This method is the one which I shall employ.

By examining the reports of over one hundred cities and towns, covering a period of from one to five years, I have obtained fifteen statements from which one can infer, with fair accuracy, the comparative lengths of the elementary school grades for each city in question; and four in which the same is true for the high-school grades also.

Although it is the *relative* length of the different grades which is to be measured, I shall give first the actual percentages of pupils who at the end of the year fail to be promoted, and would therefore be compelled to repeat the work of the grade if they remained in school. I give them because they are original data bearing on the general problem of retardation, and are in some respects superior to the statistics of over-age pupils that have hitherto been collected. These percentages of pupils failing of promotion are calculated, when it is possible, directly as percentages of those enrolled in the grade at the end of the year, but in the case of

three cities, Chicago, Kansas City, Mo., and Rochester, the best that could be done was to infer the enrollment at the end of the year according to the method shown on pages 241–243 of The Psychological Clinic, vol. III. The calculated proportion of pupils enrolled at the end of the year who failed of promotion, is given in Table 5. I have, in what follows, used grades 2 to 8 rather than 1 to 8, because of the very great variability among cities in the proportion of failures in the first grade and because of certain eccentricities in the reports of first grade enrollments . . . .

[Here follows in the original report an account of how far these percentages of failure on enrollments are valid measures of the inequality of the grades in length and of certain conclusions which can *not* be drawn from them.]

There are other interesting considerations with respect to what these statistics of failure do *not* mean and do *not* imply. But it will be better to devote the remaining space to showing what they do mean, first, with respect to the course of study, second with respect to retardation, and third with respect to elimination.

Fortunately, in considering these topics we can use measurements of the relative length of the grades from more cities than I have reported. Ayres ['09], working with recent reports, has found records in sixteen cities, thirteen of which are not included in my list. No substantial difference appears between the results from combining all the cities in both studies, and the results from either set separately, but the reliability is, of course, about one and four-tenths times as great. I have therefore recalculated all my results, after adding the thirteen cities.

We have then as the percentages of the June enrollment which fail of promotion these central tendencies for the grades in order.[1]

[1] Using the average of the A and B halves of the grades of Manhattan and Brooklyn.

TABLE 5

PROPORTION OF PUPILS ENROLLED AT THE END OF THE YEAR WHO FAIL OF PROMOTION. 15 CITIES

| GRADES | Kinder-garten | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 1 H | 2 H | 3 H | 4 H |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brooklyn, N. Y., 1908 | .505 | .28 | .145 | .125 | .130 | .135 | .135 | .135 | .130 | .160 | .150 | .160 | .160 | .180 | .160 | .145 | .090 | .... | .... | .... | .... | .... | .... |
| Chester, Pa., 1903 | ..... | .23 | | .12 | | .16 | | .21 | | .23 | | .34 | | .27 | | .40 | | .... | .... | .24 | .15 | .22 | .0 |
| Chicago, Ill., 1899 | ..... | .36 | | .18 | | .15 | | .14 | | .18 | | .17 | | .16 | | .30 | | .... | .... | .20 | .20 | .16 | .02 |
| Columbus, Ohio, 1902 | ..... | .38 | | .10 | | .16 | | .21 | | .19 | | .18 | | .09 | | .18 | | .... | .... | .22 | .20 | .33 | .08 |
| Elgin, Ill., 1901 | ..... | .035 | | .05 | | .06 | | .08 | | .09 | | .09 | | .10 | | .12 | | .... | .... | .... | .... | .... | .... |
| Jamestown, N. Y., 1898 and 1899 | ..... | .24 | | .15 | | .14 | | .10 | | .12 | | .09 | | .14 | | .30 | | .... | .... | .... | .... | .... | .... |
| Kansas City, Mo., 1907 | ..... | .26 | | .11 | | .13 | | .24 | | .24 | | .28 | | .25 | | .17 | | .... | .... | .... | .... | .... | .... |
| Manhattan, N. Y., 1908 | .510 | .290 | .150 | .135 | .130 | .130 | .130 | .140 | .150 | .165 | .160 | .150 | .145 | .185 | .140 | .155 | .170 | .... | .... | .... | .... | .... | .... |
| Pasadena, Cal., 1900 and 1902 | ..... | .30 | | .17 | | .27 | | .24 | | .21 | | .22 | | .25 | | .32 | | .... | .... | .... | .... | .... | .... |
| Rochester, N. Y., 1897 | ..... | .36 | | .14 | | .16 | | .16 | | .18 | | .15 | | .22 | | .20 | | .24 | .... | .... | .... | .... | .... |
| San Francisco, Cal., 1892 | .34*a* | .19 | | .23 | | .27 | | | | | | | | | | | | | | | | | |
| Stockton, Cal., 1893 | ..... | .32 | | .08 | | .17 | | .25 | | .25 | | .23 | | .17 | | .10 | | o | .... | .... | .... | .... | .... |
| Trenton, N. J., 1896 and 1897 | ..... | *b* | | ..... | | .12 | | .19 | | .15 | | .06 | | .16 | | .06 | | .... | .03 | .09 | o | o | .... |
| Utica, N. Y., 1900, 1901, and 1902 | .2 | ..... | | .10*c* | | ..... | | ..... | | .10*d* | | ..... | | .13 | | .23 | | .26 | .... | .... | .... | .... | .... |
| Wheeling, W. Va. 1908 | ..... | .50 | | .30 | | .27 | | .35 | | .34 | | .13 | | .21 | | .08 | | .... | .... | .... | .... | .... | .... |

*a* "Receiving class." *b* The figure for grade 1 will be very high, as the enrollment of grade 1 is very much larger than that of 2 or 3.
*c* For grades 1, 2, and 3 together. *d* For grades 4, 5, and 6 together.

| Grades..... | 2 | 3 | 4 | 5 | 6 | 7 | Last grammar | 1H | 2H | 3H | 4H |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Medians..... | 12.25 | 14. | 14.75 | 16. | 14.25 | 15. | 12.5 | 21 | 20 | 16 | 5 |

*Promotion and the Course of Study*

It is desirable that the course of study should be stated in terms of objective achievement grade by grade, so that teachers may know what their pupils are supposed to accomplish.[1] It would be desirable also to have this series of stages of achievement correspond to equal time-units for the average, or better, the modal child, *i. e.* to have each grade in succession represent what would be a year's or half year's work for him, *if all the children stayed to complete the course*, or if elimination were random with respect to school ability.[2] As things are, it is desirable to have each grade represent a year's or a half year's work for the modal child *who enters that grade*. There is no demonstrable tendency in the city schools *as a group* to depart from the second standard, except in the first grade. Individual cities, of course, may seem to be acting unwisely in making ostensibly equal grades really very unequal. Before passing judgment on any city, however, its practice over several years must be studied and all the circumstances determining its policy must be considered. The apparent departure of making grade 8 too short as compared with grades 3 to 7, may be entirely due to the greater elimination during the year in grade 8 of those who, if they stayed, would fail of promotion. The same fact must be considered in connection with the apparent shortness of the third and fourth years of the high school, although in this case there is perhaps a real error in

[1] With allowances, of course, first for individual differences among pupils, the work of a grade not being required to be done by all with exactly the same degree of excellence; and secondly for different courses of study for different types of pupil.

[2] The reasons for this are economy and convenience. More rapid courses for more gifted pupils might well crowd the work in some semesters and relax it in others with still greater economy. On the other hand, slower courses might at times be more economical.

making the first year of the high school too hard in comparison with the last two.

The first grade is probably longer for those who enter it than later grades are for those who enter them, although of course not nearly so much longer as it seems. The best practical solution may be, not to lessen its work, but to add an easier preparatory grade and admit to the first grade only the pupils who are ready for it—those who can reach the standard of the modal pupil in the normal time.

### *Promotion and Retardation*

Retardation is commonly taken to mean the fact that a pupil is in a lower grade than he would be if he had begun school at the usual age and had progressed one grade each year. This raises certain difficulties in making allowance for systems which use seven or nine grades for the work usually done in eight, and lacks the objectivity and uniformity which would be gained if we could establish certain definite amounts of achievement in terms of knowledge, power, skill, etc., to be expected at each age, and could use "retardation" for the degree of inferiority of a child to the amount of achievement to be expected at his age. But until such standards of school progress are available, and until children are measured by them, we may profitably use the customary definition of retardation.

Accepting this definition of retardation, our figures suggest two facts not hitherto sufficiently emphasized. There is no support whatever in fact for the doctrine that the retarding force is greater in the early than in the later grades (grade 1 being left out of the question). Indeed, *the same pupil* will commonly spend a considerably *longer* time in grades 6, 7, and 8 than in grades 2, 3, and 4. Certain pupils are not retarded in grades 6, 7, and 8 for the sole reason that they are not there to be retarded —they have been eliminated. If all pupils stayed in school until

twenty, and the present standards of promotion were maintained, retardation would be measurably greater in grades 6, 7, and 8, than in grades 2, 3, and 4.

In these facts of promotion and failure there is no support whatever for the doctrine that retardation by non-promotion at the end of the year is an injustice to the pupil retarded. As a matter of fact, there is probably far more injustice done to the gifted one-seventh who are not promoted "doubly,"—*i. e.* allowed to complete a grade in less than a year—than is done to the one-seventh who fail of promotion in one year. Systems of promotion need to be fitted to individual differences in capacity—to be made more *flexible*—rather than to be made *easier* for those who now fail. It is of course true that teachers may exaggerate the importance of satisfactory achievement in one grade as a prerequisite for success in the following grade, that they may exaggerate the bad effects upon the zeal of a school from treating competent and incompetent pupils alike in promotion, and that they may even be stupidly unjust in a few cases. But with rare exceptions, teachers refuse promotion to a pupil only because they honestly think he is not fit to do the work of the next grade and that it is not for the common good to let him attempt it; and in a majority of cases they are right. Special industrial and trade schools in which pupils who make slow progress in the typical elementary schools could be given a trial at another sort of education, would be more to the advantage of the eleven-year-old pupils now found in the third grade, the twelve-year-olds in the fourth, and the thirteen-year-olds in the fifth grade, than such a relaxation of standards in the typical school as would allow the less scholarly children to progress in it at the speed now expected of the modal child.

### *Promotion and Elimination*

We can estimate the number of pupils who continue to any given grade in two ways. What these are will be clearer, if we

take first an arbitrarily simple case and analyze it. Suppose first that for thirty years or so the population of a community is stationary, that no one dies before twenty-five, that there is no immigration or emigration, that one hundred pupils begin school each year, that every one stays in school until the end of the high school, and that every one begins at the beginning and spends just one year in each grade. Then the number of pupils in each grade will be one hundred. Suppose that in each grade all of those entering it spend just two years; the number in each grade will be two hundred, or twice as large as the number beginning school in one year. Suppose that in each grade 84 per cent of those entering it stay just one year, and 16 per cent just two years. After such action has been under way long enough, the numbers in all the grades will still be alike, but each will be one hundred and sixteen, or 16 per cent larger than the number beginning school in any one year.

Suppose now that of those entering each grade 84 per cent stay just one year and 16 per cent just two years, and also that in every year of the thirty years one-half of the children in the sixth grade in June leave school. Then we should have as the relative sizes of our grades in the middle of thirty year period 116, 116, 116, 116, 116, 116, 58, 58, 58, 58, etc. The proportion which grade seven was *of any early grade* would represent the proportion of pupils beginning school who continue to the seventh grade, which is, of course, one-half. The proportion which the seventh grade was *of the number beginning school in one year* (58 per cent) would be an overestimate of the proportion continuing in school to the seventh grade, for the same reason that the process in the sixth grade would give 116 per cent continuing in school. What is required is the proportion which the number beginning the seventh grade *in one year* is of the number beginning school in one year. This case may be generalized in the form of two laws:— (1) Disregarding growth of population, immigration, emigration,

and death, if the rate of progress in a grade of those entering it—*i. e.* the frequency and degree of their retardation or acceleration,—is equal for all grades, any decrease of a later as compared with an earlier grade is due to elimination; and (2) Disregarding as before all factors save retardation and elimination, if in any grade there is an excess of retardation over acceleration, the number of those found in that grade at the beginning of one year, if there has been zero elimination, will be over 100 per cent of those beginning school in one year, and by an excess proportionate to the excess of retardation in that grade.

It is therefore obvious that the percentage of pupils beginning school who are retained to any grade, cannot be measured by the percentage which the pupils in that grade are of the number beginning school in one year. If the latter figure is taken as a base, the other figure must be *those beginning that grade in one year.*

If retardation is equal in all grades, then, as we have seen, the numbers in the grades at the beginning of the year give us, by their differences, the elimination (disregarding growth of population, etc.). If it is unequal, we must correct for it. We have shown that it is approximately equal from the second grade to the third year of the high school inclusive, in the sense that in any June the proportion of pupils destined, if they stay in school, to repeat the grade, is for these grades in order .122, .14, .1475, .16, .1425, .15, .125, .21, .20, .16. But it is likely that those so destined will leave school before the next year's enrollment record is taken, more often than will those who did not fail; and it is likely that this excess elimination of those who fail will be greater in the higher grades than in the lower.

This implies the possible need of a second correction, for the excess elimination of non-promoted over promoted pupils, and for the increase in this excess as we pass to later and later years.

[Here follows, in the original report, an account of the available

facts for the calculation of the elimination of pupils who fail of promotion.]

On the whole I estimate that, of pupils failing of promotion in the last grammar grade, about one-third are eliminated before the next year's enrollment is counted; of pupils failing in the next to the last grammar grade, about one-fourth; of pupils in the sixth grade, about one-fifth; and of pupils in the fifth grade about one-sixth. If these estimates are fair, the failures in grade six, seven, and eight continue to the following year at least eight-tenths as often as those promoted. At all events, Mr. Ayres is certainly wrong in supposing that only "a few—a very few—pupils get to the seventh or eighth grade, fail of promotion, and repeat the work of the grade."[1] In Galesburg about half of the last grammar grade is made up of such repeaters, and in Kansas City about one-eighth. In Springfield about half of those failing repeat the grade, and in Williamsport four-fifths.

[The rest of the original report is given up to an estimate of the elimination grade by grade from the comparison of the number enrolled in any grade with the number beginning school in one year the appropriate number of years before. The errors made by Ayres in the use of this method are pointed out together with the resulting constant error in his estimates of elimination. I note here only the essential procedure in the method.]

Call the number of pupils at the beginning of one year in grades two, three, four, and five, Pop. 2, Pop. 3, Pop. 4, and Pop. 5, respectively.

Call the numbers failing in one year, $f_2$, $f_3$, $f_4$, and $f_5$, respectively.

Call the numbers promoted in one year, $p_2$, $p_3$, $p_4$, and $p_5$, respectively.

Call the numbers skipping one of these grades in one year, $s_2$, $s_3$, $s_4$, and $s_5$, respectively.

[1] Ayres, Leonard P., *Laggards in our Schools*, p. 93.

Call the numbers eliminated from school otherwise than by death, in the one year *before reaching the grade*, $e_2$, $e_3$, $e_4$, and $e_5$, respectively.

Then, disregarding increase of population, death, and migration into and out of the school system,

$$(1) \quad \text{Pop. } 3 = p_2 + f_3 + s_2 - s_3 - e_3$$
$$(2) \quad \text{Pop. } 4 = p_3 + f_4 + s_3 - s_4 - e_4$$
$$(3) \quad \text{Pop. } 5 = p_4 + f_5 + s_4 - s_5 - e_5$$

Call the number beginning school in one year, A.

Then:

$$\frac{\text{Pop. } 2}{A} = R_2, \text{ a per cent to be determined by observation}$$
$$\frac{\text{Pop. } 3}{A} = R_3 \quad " \quad " \quad "$$
$$\frac{\text{Pop. } 4}{A} = R_4 \quad " \quad " \quad " \quad \text{etc.}$$

From the present study, we have found:

$p_2 = 87.7$ Pop. 2 $\qquad f_2 = 12.3$ Pop. 2
$p_3 = 86.0$ Pop. 3 $\qquad f_3 = 14.0$ Pop. 3
$p_4 = 85.2$ Pop. 4 $\qquad f_4 = 14.8$ Pop. 4
$p_5 = 84.0$ Pop. 5 $\qquad f_5 = 16.0$ Pop. 5

If we assume that $s_2 = s_3 = s_4 = s_5$ (approximately), equations (1),(2) and (3) become (approximately):

$$R_3 A = 87.7 R_2 A + 14.0 R_3 A - e_3$$
$$R_4 A = 86.0 R_3 A + 14.8 R_4 A - e_4$$
$$R_5 A = 85.2 R_4 A + 14.3 R_5 A - e_5$$

Whence $e_3$, $e_4$ and $e_5$ can be calculated, subject to further corrections for skipping, the birth and death rates, migration into and out of the community concerned, public-private-school transfers and the like.

## § 4. The Incidence of Retardation

In the previous section attention was called to the common opinion that the course of study was so arranged as to be specially likely to require two years per grade in the early grades. It was shown that, on the contrary, failure of promotion would, if present standards were maintained and if all pupils stayed in school to finish the elementary school, be *less frequent* in the lower than in the higher grades.

This Dr. Blan ('11) has verified for certain cities by a study of the individual educational histories of pupils as reported by themselves, verified from school records so far as possible.

His facts are shown in Tables 6, 7, 8, and 9, Table 6 shows the frequency of non-promotion in each grade in the case of pupils who were known to have progressed in school to the eighth grade. Thus taking the top line of entries in Table 6, we read that of the pupils in the eighth grade of certain schools in New York City who had remained in the same school from the time they began school, 9.5 per cent had (according to their testimony) been held back in grade 7, 8.2 per cent had been held back in grade 6, 5.5 per cent in grade 5, 4.1 per cent in grade 4, and so on.

TABLE 6

Per Cents of Eighth Grade Pupils Failing of Promotion in Preceding Grades

| Cities | Grades | | | | | | |
|---|---|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| New York.... | 9.5 | 8.2 | 5.5 | 4.1 | 3.9 | 1.6 | 1.2 |
| Paterson..... | 7.9 | 5.0 | 4.6 | 4.3 | 3.0 | 2.4 | 2.6 |
| Elizabeth.... | 9.2 | 2.1 | 2.1 | 4.2 | 4.9 | 3.5 | 3.5 |
| Plainfield .... | 20.0 | 10.8 | 10.0 | 5.4 | 6.2 | 7.7 | 30.8 |
| East Orange . | 14.9 | 7.0 | 4.4 | 4.4 | 2.6 | 0.9 | 3.5 |
| Medians .... | 9.5 | 7.0 | 4.6 | 4.3 | 3.9 | 2.4 | 3.5 |

Table 7 shows the frequency of non-promotion in each grade in the case of pupils known to have progressed in school to the seventh grade.

Tables 8 and 9 show similarly the history of the non-promotion in the case of pupils found in grades 6 and 5. Throughout, *non-promotion is for the same student more frequent, the later the grade.* Dr. Blan says:—

TABLE 7

PER CENTS OF SEVENTH GRADE PUPILS FAILING OF PROMOTION IN THE SEVENTH AND PRECEDING GRADES

| Cities | Grades | | | | | | |
|---|---|---|---|---|---|---|---|
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| New York... | 12.2 | 8.1 | 7.3 | 5.8 | 3.9 | 2.0 | 2.2 |
| Paterson..... | 8.1 | 5.3 | 6.3 | 4.8 | 3.9 | 2.9 | 2.8 |
| Elizabeth... | 12.4 | 4.7 | 4.1 | 2.6 | 4.1 | 5.7 | 7.8 |
| Plainfield.... | 14.0 | 18.4 | 7.2 | 6.8 | 5.3 | 6.3 | 30.0 |
| East Orange. | 11.4 | 7.6 | 8.9 | 6.3 | 2.5 | 3.8 | 5.1 |
| **Medians....** | **12.2** | **7.6** | **7.2** | **5.8** | **3.9** | **3.8** | **5.1** |

TABLE 8

PER CENTS OF SIXTH GRADE PUPILS FAILING OF PROMOTION IN THE SIXTH AND PRECEDING GRADES

| Cities | Grades | | | | | |
|---|---|---|---|---|---|---|
| | 6 | 5 | 4 | 3 | 2 | 1 |
| New York..... | 10.2 | 10.5 | 7.7 | 7.2 | 4.9 | 2.6 |
| Paterson..... | 10.3 | 6.5 | 4.8 | 6.2 | 3.2 | 3.5 |
| Elizabeth..... | 12.3 | 10.2 | 9.8 | 5.3 | 3.7 | 4.1 |
| Plainfield..... | 16.1 | 10.4 | 8.7 | 6.5 | 7.0 | 32.2 |
| East Orange..... | 13.8 | 7.7 | 4.6 | 6.2 | 6.2 | 7.7 |
| **Medians.....** | **12.3** | **10.2** | **7.7** | **6.2** | **4.9** | **4.1** |

TABLE 9

PER CENTS OF FIFTH GRADE PUPILS FAILING IN THE FIFTH AND PRECEDING GRADES

| Cities | Grades | | | | |
|---|---|---|---|---|---|
| | 5 | 4 | 3 | 2 | 1 |
| New York | 11.2 | 9.2 | 9.6 | 6.6 | 5.0 |
| Paterson | 9.4 | 5.9 | 6.5 | 5.2 | 4.8 |
| Elizabeth | 19.0 | 12.1 | 10.1 | 8.1 | 7.2 |
| Plainfield | 15.2 | 13.3 | 6.3 | 5.7 | 39.2 |
| East Orange | 10.2 | 7.2 | 7.2 | 10.2 | 8.2 |
| **Medians** | **11.2** | **9.2** | **7.2** | **6.6** | **7.2** |

"That the pupils find the lower much easier than the upper grades is the definite tendency as shown in the foregoing tables. Table 6 indicates the seventh grade with a median of 9.5 per cent as having been the most difficult grade for the present eighth grade pupils. Table 7 indicates the seventh grade again with a median of 12.2 per cent as the most difficult grade for the present seventh grade pupils. In Table 8 the sixth grade pupils show the largest percentages of non-promotion in their present grade. The progress of the fifth grade pupils according to Table 9 is impeded more in the fifth grade than in any of the preceding grades. In grades five, six, and especially seven, the chances of retardation in the case of any given pupil are decidedly more than in any of the other grades. The pupil who is fortunate enough to withstand the strain of the difficult seventh grade is practically offered the assurance of success on entrance to the comparatively easy graduating class.

"Taken generally the grammar grades exert much more pressure on the pupils in the matter of retardation, than do the primary grades. It is more than probable that, were all the 'hold-

overs' in grades one through four to remain in school, the percentages of retardation in the upper grades would be still larger.

"Tables 6 to 9 record the distribution of non-promotion in hundredths of the grammar grade initial starters. These pupils represent a selected class as compared with the children migrating from school to school. It is fair to suppose that, were the histories of these shifting pupils studied, the same progressive increase in grade frequency would be the characteristic tendency.

"The records of the initial starters were obtained from the individual pupils in class room and were checked by a careful study of the individual history cards. These cards registered accurately the frequency of grammar grade retention. In the case of non-promotion in the primary grades, where the official records were not obtainable, errors of memory would necessitate some correction of the recorded percentages. Even with a generous corrective allowance there is every reason to believe that the classes would still be progressively harder from the first to the last year of the school. At any rate the burden of proof rests upon those who fancy that a pupil is more likely to suffer retardation in early than in late grades." ['11, p. 108.]

## § 5. The Causes of Retardation and Acceleration

Dr. C. H. Keyes ['11] has studied the effect upon a pupil's rate of progress through the grades of: Age at entrance to school, absence, visual defects, family conditions (including heredity) over which the schools have little control, and other influences. His study concerns the school population of a single city, Hartford, during recent years. Under the administrative arrangements of that city at that time the pupils who repeated one or more grades, those who neither repeated nor skipped, and those who skipped one or more grades, manifested the differences and absences of difference shown in Table 10.[1]

TABLE 10

The Comparison of Accelerated, "Normal" and Retarded Pupils in Age at Entrance to School, Etc.

| | Arrests | Normals | Acceler-ates | Honors |
|---|---|---|---|---|
| Median age at entrance to Grade 1 | 6.2 | 6.2 | 6.4 | 6.2 |
| Per cent entering under 5½ yrs. old | 5.9 | 5.7 | 2.3 | 1.4 |
| Per cent entering over 7½ yrs. old | 11.4 | 4.2 | 9.5 | 2.0 |
| Average annual loss in days | 12.3 | 10.2 | 9.7 | 6.8 |
| Per cent losing 4 wks. or more in some one year | 76.6 | 68.4 | 66.6 | 45.3 |
| Per cent with defective eyes | 32. | 25. | 14. | 16. |
| Per cent changing schools in the year in question | 40. | 26. | 14. | 0. |
| Per cent from non-English speaking homes | 40. | 27.5 | 17. | 27. |
| Average deportment ranking for 6 years | 86. | 86.6 | 92. | 93. |
| Per cent of each class in the system | 24. | 46. | 30. | |

The influence of irregularity of attendance would be much clearer if measured also by the different probabilities of arrest

[1] Quoted from page 54 of *Progress Through the Grades of City Schools.*

(1) for pupils absent for different lengths of time in the year preceding that in which they repeat a grade, (2) for pupils absent different lengths of time in the two years preceding, and (3) for pupils absent different lengths of time in the three years preceding, and so on. Dr. Keyes gives data from which the first of these probabilities can be approximately estimated. They are as follows:

Ten thousand two hundred and fifteen year-records were taken, 3623 from children who at some time skipped a grade, 3000 from children who neither skipped nor repeated, and 3592 from children who at some time repeated a grade.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 8,910 | of the | 10,215 | showed | absences | of | 0 | to | 19 | days |
| 648 | " | " | " | " | " | 20 | " | 29 | " |
| 303 | " | " | " | " | " | 30 | " | 39 | " |
| 149 | " | " | " | " | " | 40 | " | 49 | " |
| 306 | " | " | " | " | " | 50 days or more | | | |

I cannot ascertain from Dr. Keyes' report how many of those absent 0 to 20 days failed of promotion that year. Of those absent 20–30 days, 92, or 14 per cent, failed of promotion; of those absent 30–40 days, 45, or 15 per cent, failed of promotion; of those absent 40–50 days, 20, or 14 per cent, failed; of those absent 50 days or more, 152, or 50 per cent, failed.[1] The last group, of course, included many who entered the first grade and were withdrawn, or who were later kept out of school for a very large fraction of the year. Consequently its percentage is not directly comparable with the other percentages.

Dr. Keyes' data also permit us to calculate similar probabilities for the class of pupils who at some time do have to repeat a grade. Given the kind of pupil who, at some time in his school

[1] Any prospective reader of Dr. Keyes' report should note that his Table 28, p. 41, is in error, by reason of a slip whereby he added in as "*arrests in the year*" all the data for "normals" absent 20 days or more.

course, fails to meet the requirements for promotion, what effect has absence? For such pupils:

| | | |

TABLE 11

SIBLINGS AMONG ACCELERATES AND ARRESTS

| *Accelerates* | | | *Arrests* | |
|---|---|---|---|---|
| 34 | 17 pairs | 2 Brothers | 28 pairs | 56 |
| 42 | 21 pairs | 2 Sisters | 11 pairs | 22 |
| 42 | 21 pairs | Brother and Sister | 28 pairs | 56 |
| 15 | 5 trios | 2 Brothers, 1 Sister | 3 trios | 9 |
| 3 | 1 trio | 3 Brothers | 1 trio | 3 |
| 3 | 1 trio | 3 Sisters | 1 trio | 3 |
| 139 Accelerates, 66 Families | | | 72 Families, 149 Arrests | |

Thus 7.7 per cent of the families occasion 24.5 per cent of the arrests and 6.8 per cent of the families secure 24 per cent of the double promotions. On the other hand only thirty mixed contributions appear. The cases are as follows:

| | |
|---|---|
| Brother who gains and sister who repeats | 3 cases |
| Sister who gains and brother who repeats | 15 " |
| Brother who gains and brother who repeats | 3 " |
| Sister who gains and sister who repeats | 9 " |

Will any uniform course of study meet these conditions? Must not the programs of study in every grade present a minimum and a maximum schedule of work to be done? The same school nurture can never produce even approximately similar results for groups varying as widely in nature and home nurture as those represented by the accelerates and arrests involved in this study." [1]

Late entrance to school is a common cause of over-ageness, or retardation in the customary sense. Since those who enter early lose a grade no more frequently than those entering late, the latter obviously tend to contribute largely to the over-age pupils. Now late entrance is in large measure a secondary result of orig-

[1] *Progress through the Grades of City Schools*, p. 30f.

inal lack of scholarly ability. If the children who now begin grade 1 at seven or older were all sent at six or younger, very many of them would have to spend two or more years in that grade. Many of them are now kept out because they are not intellectually fit to go to school.

## § 6. The Causes of Elimination

By making use of the method of following the educational careers of individual pupils Dr. J. K. Van Denburg ['11] was able to measure the actual effects of various possible causes of elimination in the case of a thousand pupils taken at random from those entering the public high schools of New York City in February, 1906.

He got from each pupil a record like the following:

(1) _____
Last name First name Initial School Year of birth Month Day

(2) _____
Number Street Borough Number Street Borough

(3) _____
From G. S. No. Borough Father's busines Father's nationality

(4) _____ { (1) _____ (2) _____
What do you intend to do for a living? (1) Are four years of H. S. necessary? (2) Do you intend to stay in H. S. four years?

(5) _____
Older brothers or sisters Age What are they doing?

(6) _____

(7) _____

(8) _____

(9) _____
Height Weight What serious illness have you had? When?

(10) _____
Do you have severe headaches? How frequently? Do you wear glasses?

(11) _____

(12) _____

He got further, by visiting their residences, the rentals of the apartments in which they lived, in the case of about half of the pupils. He got, for all those who stayed in school through the first term of five months or long enough to have marks for scholarship given to them, the average of their marks for the first term (or such part of it as was the basis of the marks). He also got,

from the four teachers who taught each pupil during the first term (or from so many of the four as he could), ratings of the pupil for *Ability*, *Industry* and *Results*. These qualities were defined as follows in the written instructions sent to the teachers:

> You are asked to grade the class, a list of whose members accompanies this sheet, according to their relative rank so far as you can judge in each of six characteristics. In order that this work may be uniform, a more detailed explanation of the sense in which the various terms are used is given below.
>
> 1. ABILITY. Native ability apart from success or failure in any particular subject of study. Natural brightness.
>
> 2. INDUSTRY. Application to school work whether pleasant or unpleasant. Determination to accomplish an assigned task. Stick-to-it-iveness.
>
> 3. RESULTS. General efficiency. Not only undertaking a task or a line of work, but actually accomplishing some result in it. (This does not mean reliability or trustworthiness.) . . .
>
> The method of marking is as follows: For example, take the first column. Mark the boy or girl whose native ability you consider the best in the class + 1. The pupil whose native ability you consider the poorest mark — 1. In the same way mark the next to the naturally brightest + 2, and the next to the naturally dullest — 2. In this way grade so far as possible the entire class. When you find the plus and minus rankings to approach each other so closely that you are unable to distinguish any differences, mark the remaining pupils "M."

He then kept track of every pupil of the thousand until he or she left high school, graduated, or remained four years but without graduating. "Left high school" means left the public high schools of New York City without any evidence being present that the pupil was moving to some other city or transferring to a private school within it. The approximate date of each pupil's leaving was determined.

We can thus answer for this group of a thousand either the question—"What characterizes the pupils who stay long compared with those who leave early, in respect to age at entrance, wealth of family, record for scholarship in the first few months, etc., etc.?"—or the questions—"How much longer do rich pupils stay than poor pupils?" "How much longer do pupils of

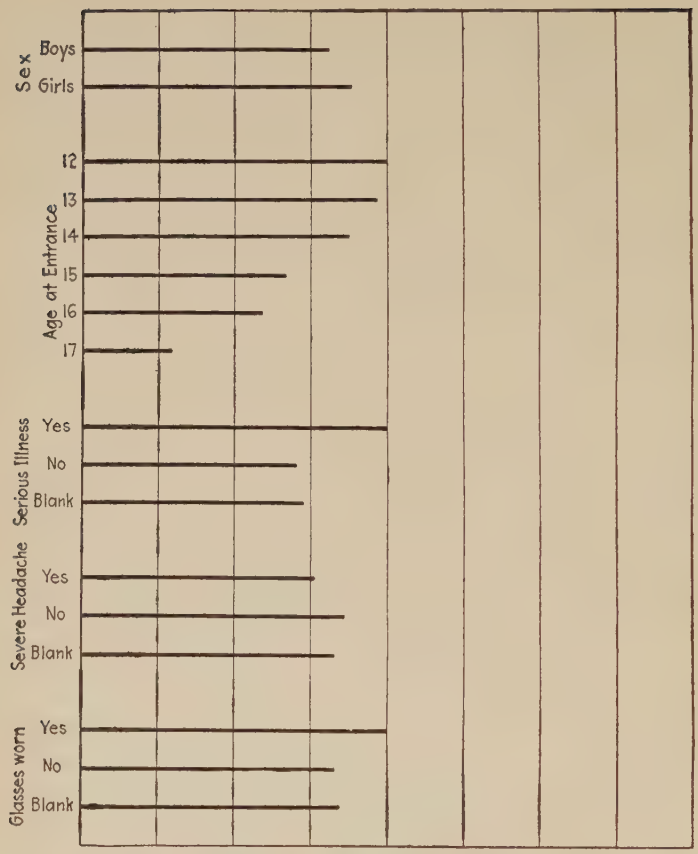



FIG. 4. Expectation of high-school life. Median length for boys and girls; for children 12, 13, 14, 15, 16 and 17 years old at entrance; for children answering "yes," "no" and "blank" to "What serious illness have you had?" and for children answering "yes," "no," and "blank" to "Do you have severe headaches?" Each centimeter equals one term of five months.

American born fathers stay than pupils whose fathers were born in Ireland?" etc., etc.

The former method is the one used in the main in Dr. Van

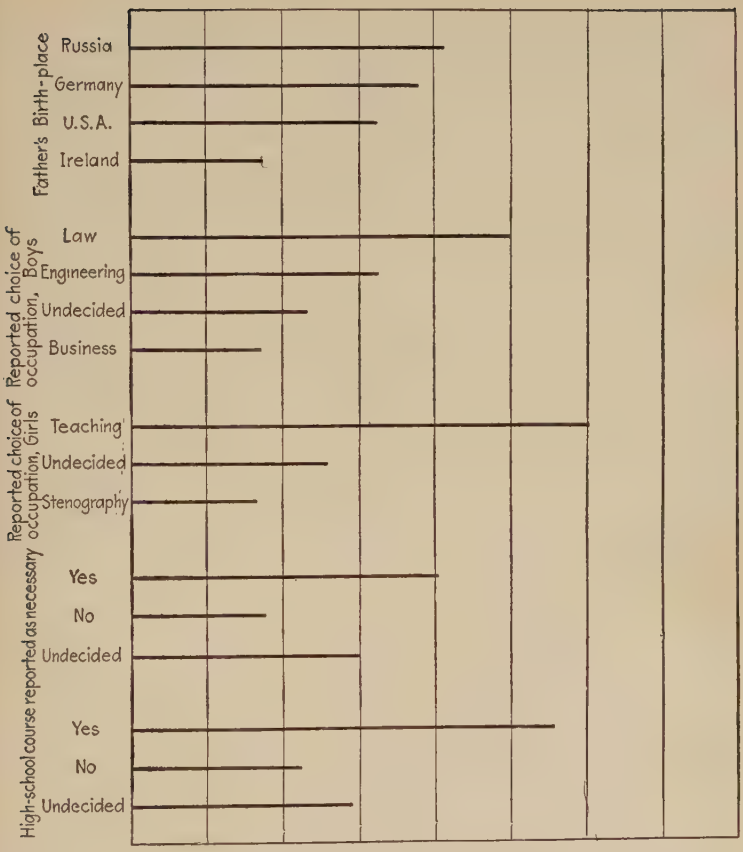



FIG. 5. Expectation of high-school life. Median lengths for children of Russian (Hebrew), American, German, or Irish born fathers; for boys reporting law, engineering, "undecided" or business as their chosen work, and for girls reporting teaching, "undecided" and stenography; and for boys and for girls (boys, above; girls, below) answering "yes," "no" and "undecided" to the question, "Are four years of high school necessary?"

Denburg's report, but data are there given which permit the latter sort of questions to be answered. So I have computed the expectation of high-school life according to whether or not cer-

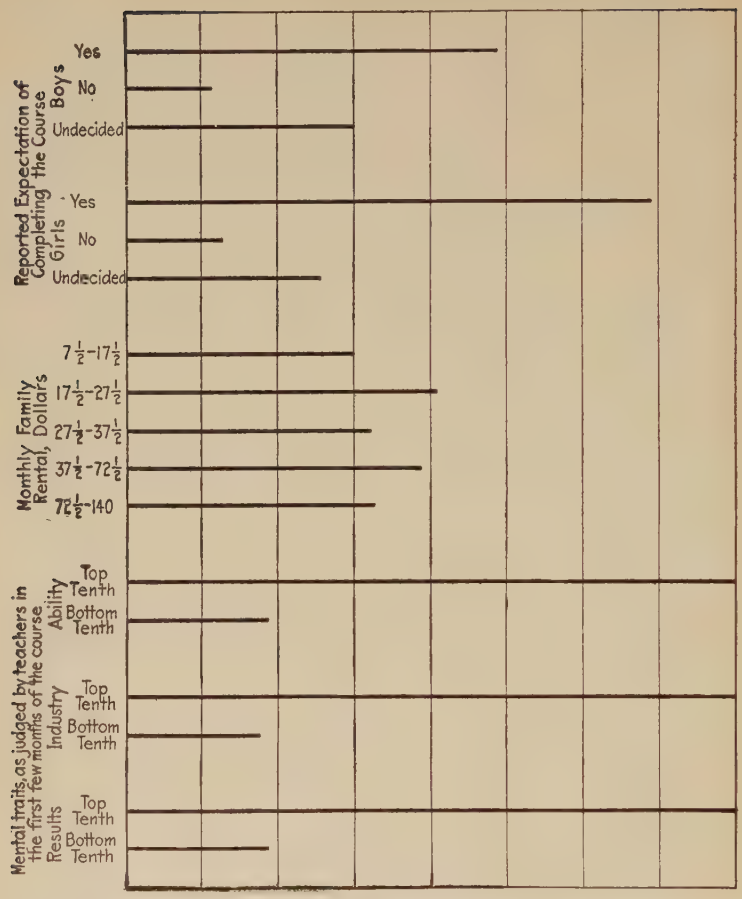



FIG. 6. Expectation of high-school life. Median lengths for boys and girls answering "yes," "no" and "undecided" to the question, "Do you intend to stay in high school four years?"; for boys and children with home rentals of $10–$20, $20–$30, $30–$40, $40–$70 and over $70 per month; and for the top and bottom approximate tenths in ability, in industry and in results as estimated by teachers.

tain causes are acting. The results are presented clearly to the eye in Figs. 4, 5, 6, and 7. In all these diagrams, one centimeter

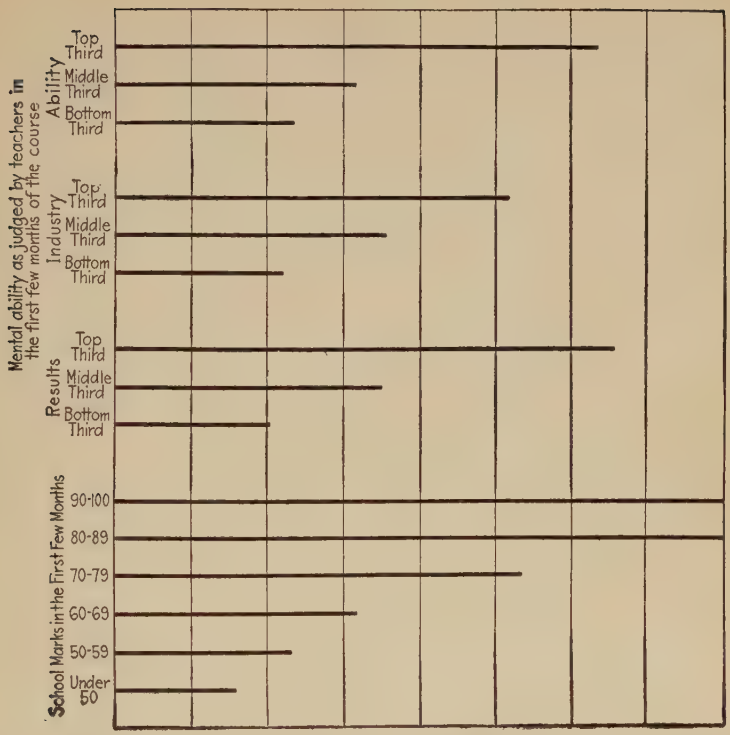



FIG. 7. Expectation of high-school life. Median lengths for the top, middle and bottom thirds in ability, industry and results as estimated by teachers, and for children whose first term's marks in scholarship were:—below 50, from 50 to 59, from 60 to 69, from 70 to 79, from 80 to 89, and from 90 to 100.

equals one term or five months. At the top and at the bottom of each page are scales eight centimeters long representing the eight terms, or four years, or forty months. Each of the lines between represents the median length of stay, in the New York public high schools, of pupils characterized by the statement at the left. Thus Fig. 4 shows that being a girl rather than a boy adds one and a third months, or eight per cent, to the expectation of high-school life; each year that a pupil is under 14 at en-

trance adds to, and each year that a pupil is over 14 at entrance takes away from, his expectation of life, pupils 12 years old at entrance staying three and a half times as long as those 17 years old, and nearly one and three-fourths times as long as those 16 years old. Those who report themselves at entrance as having had serious illness stay longer than those who do not. Habitual severe headaches make no considerable difference. Those who wear glasses stay two-thirds of a term longer than those who do not.

The diagrams tell their own story better than words. If a record such as Dr. Van Denburg got from these thousand pupils should be obtained from all the entering pupils of New York City's public schools, we could prophesy the length of each one's career as we now prophesy the temperature of a day in December, the daily horse-power to be got from a stream, or the length of a patient's illness. If we knew nothing at all of a pupil entering in February, 1906, save that he did enter, we could foretell that he had an even chance of staying three and two-fifths terms, or 17 months. Know also that his father was born in Russia, and you can add 3 months to his expectation. Know that his father was born in Ireland and you can reduce his expectation to 8.8 months, or a little over two-fifths that of the Russian Hebrew. Know that a boy reports himself as intending to be a lawyer, and you can expect him to stay nearly two and a half times as long as a boy who reports himself as intending to go into business. Know that a girl intends to be a teacher, and her expectation of high-school life is over three and a half times as long as that of a girl intending to be a stenographer, and two and a third times as long as that of a girl reporting herself as "undecided." The mere fact that a boy or girl regards a high school course as necessary for his intended work in life more than doubles his expectation. The mere fact that a pupil reports himself as expecting to complete the course gives him nearly five times as long a probable

stay as the pupil who expects not to complete it (4.4 times for boys and 5.2 times for girls).

Such educational probabilities should be used to determine both the advice and the treatment given to individuals. High school principals should, so far as time allows, get such an initial record from each pupil, should use it for the time being in the light of Dr. Van Denburg's study, and eventually, by following two or three entering classes through four years, calculate the expectation for each factor in their own communities.

The economic condition of the pupil is shown to be relatively a minor factor. The wealthiest, the poorest, and those with monthly rentals from $27.00 to $37.00 stay in school about equally long. Practically all of the common talk about the economic factor in elimination is thus shown to have been mere speculation in the case of New York high schools. Is it perhaps equally so in the reader's own community?

The boy or girl who so impresses his teachers as to be ranked in the top tenth of the entering pupils for ability will stay four and a quarter times as long as the one who is so ranked in the bottom tenth. A rating in the top third compared with one in the bottom third nearly trebles (2.7 times) the probable high school career. An average mark of 80 or more for the first few months means a stay five times as long as an average mark below 50.

These school marks and teachers' judgments of ability doubtless measure the specialized ability to do well in scholarly work, of which interest in the high school tasks is a large component, rather than absolutely general ability for all life's work. Just how close the correlation between the two is has not been determined. But it is positive. Consequently, though freely admitting that some really gifted pupils are ranked low and that some pupils whose special gifts at lesson-getting conceal their essential stupidity are ranked high, it is nevertheless certain that one cause of elimination in New York City high schools is relative lack of intellect.

## § 7. The Variation Amongst Pupils of the Same School Grade

The pupils who are grouped together for instruction in the same grade, even in those schools which are administered with more than usual sagacity, differ greatly in ability. If they are measured for ability in arithmetic, spelling, composition, or other school studies, or in such tests as a psychologist finds most significant of general intellectual efficiency, the variation is such that some pupils in the grade do four or five times as much as others in a given time, or do the same amount with a far smaller proportion of errors, or do successfully tasks which the others cannot master.

It is indeed the case that some pupils in the third grade seem superior, in fitness to receive fourth grade education, to a majority of those in the fourth grade, that some seem superior to a fair percentage of those in the fifth grade, and so on. There is reason to believe that the eight school grades, as administered in even the most progressive cities, do not even approximately divide the school population into eight groups, each one made up of pupils fit for more advanced education than those in the previous grade are fit for.

One of the most significant demonstrations of this failure of school grading to produce a series of groups—each fairly homogeneous, and, as a series, differing progressively in knowledge, power, or anything else significant of educational advancement—is given in Dr. F. G. Bonser's "Reasoning Ability of Children of the 4th, 5th, and 6th Grades." ['10]. I shall quote, with comments, the essential facts of the demonstration, which will be found also to suggest other facts of importance in the management of schools.

Dr. Bonser measured 757 boys and girls in grades 4A, 5B, 5A, 6B, and 6A (B being used for the first, or lower, half-year of a grade; and A, for the second, or higher, half), in respect to their achievements in the following tests:

## Tests I and II

### I. A. Get the answers to these problems as quickly as you can.

1. If ¾ of a gallon of oil costs 9 cents, what will 7 gallons cost?
2. John sold 4 sheep for $5 each. He kept ½ of the money and with the other ½ he bought lambs at $2 each. How many did he buy?
3. A pint of water weighs a pound. What does a gallon weigh?
4. At 12½ cents each, how much more will 6 tablets cost than 10 pens at 5 cents each?
5. At 15 cents a yard, how much will 7 feet of cloth cost?

### I. B.

1. A man whose salary is $20 a week spends $14 a week. In how many weeks can he save $300?
2. How many pencils can you buy for 50 cents at the rate of 2 for 5 cents.
3. A man bought land for $100. He sold it for $120, gaining $5 an acre. How many acres were there?
4. A man spent $^2/_3$ of his money and had $8 left. How much had he at first?
5. The uniforms for a baseball nine cost $2.50 each. The shoes cost $2 a pair. What was the total cost of uniforms and shoes for the nine?

### II. A.

1. 32 plus what number equals 36?
2. If John had 15 cents more than he spent to-day he would have 40 cents. How much did he spend to-day?
3. What number minus 7 equals 23?
4. If James had 4 times as much money as George, he would have $16. How much money has George?
5. What number added to 16 gives a number 4 less than 27?

### II. B.

1. What number subtracted 12 times from 30 will leave a remainder of 6?
2. If a train travels half a mile in a minute, what is its rate per hour?
3. What number minus 16 equals 20?

4. What number doubled equals 2 times 3?
5. If 7 multiplied by some number equals 63, what is the number?

In the original blanks, immediately following each problem, space was left for its solution.

*Controlled Association*

For controlled association, three types of tests were used. First, two sets of ten sentences each, III, A, a and b, were given with a significant word omitted from each to be filled in by the pupil. Second, two sets of ten sentences each, III, B, a and b, were given in each of which two significant words were placed, one above the other, one giving a correct meaning to the sentence, the other an erroneous meaning, the pupil to draw a line through the wrong word leaving the sentence so that it would read correctly. Third, three sets of twenty words each, IV, A, B, and C, were given to pupils, they to write beside each respective word a word just its opposite in meaning—the familiar "opposites" test.

Tests III and IV

III. A. a. Complete the following sentences as quickly as you can by filling the blank spaces with appropriate words:

1. ———— always comes in the last week in December.
2. A ———— is one who plays a musical instrument.
3. The city ———— is in Russia.
4. ———— are large, visible bodies of watery vapor floating about in the air.
5. ———— used for building houses are made of clay.
6. The machine used on a railroad for drawing cars is an ————.
7. ———— is the most useful metal for blacksmiths.
8. ———— live and swim about in the water.
9. Most light, summer clothing is made of ———— goods.
10. ———— is a holiday.

III. A. b.

1. The flesh of cattle used for food is called ————.
2. The ———— months are June, July and August.

3. The ———— makes it light during the day.
4. ———— catch many mice and birds.
5. A ———— is a large stream of water flowing through the land.
6. Men who live in the country and till the soil are called ————.
7. ———— is a mineral which we burn.
8. The ———— Ocean is east of the United States.
9. ———— sell sugar, vegetables and other foods.
10. There are ———— hours in half a day.

III. B. a. As quickly as you can, make these sentences correct by drawing a line through the wrong word where two words occur, one above the other:

1. Days are shorter / longer in summer than in winter.
2. Water always flows up / down hill.
3. Glass breaks more / less easily than tin.
4. The sun rises earlier / later in January than in July.
5. Iron is harder / softer than wood.
6. It is warmer / colder in Florida than in Maine.
7. Anything that floats is heavier / lighter than water.
8. Oranges grow more / less satisfactorily in California than in New Jersey.
9. Shadows are shorter / longer in summer than in winter.
10. Plants grow more / less readily in warm sunshine than in the cool shade.

III. B. b.

1. Men are usually stronger / weaker than women.
2. A pound of iron is worth less / more than a pound of copper.

3. Christmas comes before / after Thanksgiving day.
4. Cotton clothing is warmer / cooler than wool.
5. Less / More coal is used in summer than in winter.
6. Bankers are poorer / richer than cab drivers.
7. More / Fewer horses than mules are used for driving purposes.
8. There are more / fewer teachers than preachers.
9. Oranges are more / less sweet than lemons.
10. More / Less bread than cake is eaten in this city.

IV. As quickly as you can, write beside each of these words a word that means exactly its opposite:

| A. | B. | C. |
|---|---|---|
| day | great | bad |
| asleep | hot | inside |
| absent | dirty | slow |
| brother | heavy | short |
| best | late | little |
| above | first | soft |
| big | left | black |
| backwards | morning | dark |
| buy | much | sad |
| come | near | true |
| cheap | north | dislike |
| broad | open | poor |
| dead | round | well |
| land | sharp | sorry |
| country | east | thick |
| tall | known | full |
| son | something | peace |
| here | stay | few |
| less | push | below |
| mine | nowhere | enemy |

### *Selective Judgment*

Two types of tests were used for selective judgment. First, two sets, V, A and B, of two series each of ten reasons why some given fact is true, some of which reasons are correct, the others incorrect or irrelevant, were given. The pupil was to select, by checking, the correct reasons. Second, there were given similarly two sets, VI, A and B. of three series each, of five definitions for a given thing or term, some of which were correct, the others incorrect or irrelevant.

### Tests V and VI

V. A. The following reasons have been given to show why New York has become a larger city than Boston. As quickly as you can, place a cross like this, +, before each reason you think a good one:

1. New York is on an island.
2. More foreigners live in New York than in Boston.
3. New York is on a large river coming from a rich agricultural region.
4. Mr. Rockefeller has a fine home in New York.
5. New York has more churches than Boston.
6. New York has better communication with the States lying to the west.
7. New York has elevated railroads.
8. New York is in the midst of a rich fruit and agricultural district.
9. New York is nine or ten years older than Boston.
10. New York has a republican governor.

V. B. These reasons have been given to show that oak wood is better than pine for making furniture. Check the good reasons.

1. Oak wood is harder than pine.
2. Oak trees have acorns, pine trees do not.
3. Oak wood takes a finer polish than pine.
4. Oak trees have more beautiful leaves.
5. Oak trees make good homes for squirrels.
6. Pine wood will not last so long as oak.

7. Pine is more easily dented and defaced than oak.
8. When polished and varnished, oak is much more beautiful than pine.
9. Pine trees are sometimes used for Christmas trees.
10. Oak trees are easier to climb than pine trees.

V. C. The following reasons have been given to show why oranges grow better in Florida than in New Jersey. Check the good reasons.

1. There are many negroes in Florida who work very cheaply.
2. Florida has warm summer weather almost the whole year.
3. There are no alligators in New Jersey.
4. Florida very rarely has hard frosts.
5. New Jersey is not so large as Florida.
6. Florida was settled earlier than New Jersey.
7. New Jersey grows many fine peaches.
8. Florida has a very moist, warm climate.
9. Florida is a word meaning the land of flowers.
10. Florida is a popular winter resort.

V. D. Among these reasons why horses are better than cattle for driving and working animals, check those which you think are good reasons.

1. Horses are more intelligent than cattle.
2. Cattle are not so tall as horses.
3. Horses like corn, oats and hay.
4. Horses are much more active and walk faster than cattle.
5. Cattle are extensively used for food.
6. Horses are much more beautiful and graceful than cattle.
7. The skins of horses are sometimes made into gloves.
8. Horses are more easily trained and controlled than cattle.
9. President Roosevelt likes to ride on horseback.
10. Horses have more rapid and varied gaits than cattle.

VI. A. In the following definitions, place a small cross, like this,+, before those which you think are good ones, doing it as quickly as you can.

a. Definitions of a *shoe*.
   1. A portion of clothing.
   2. Something black made of leather.
   3. A protective covering for the feet, usually made of leather, having a firm bottom or sole and flexible upper portions, an opening for the foot being fastened by lacings, buttons or buckles.
   4. Something to wear on the feet.
   5. A necessary article costing from one to five or six dollars.

b. Definitions of an *island*.
   1. A piece of land out in the water.
   2. A small body of land.
   3. A body of land entirely surrounded by water.
   4. Cuba is an island.
   5. A portion of land rising above the surrounding level.

c. Definitions of *to explode*.
   1. To burst suddenly with a loud noise.
   2. To knock all to pieces.
   3. To make a very loud noise.
   4. To fill the air with a tumultuous roar.
   5. To blow up.

a. Definitions of a *chair*.
   1. A piece of household furniture.
   2. A movable seat with a back intended for one person.
   3. A piece of furniture on which to sit.
   4. Rocking chairs are comfortable chairs.
   5. A single seat having a back.

b. Definitions of *to write*.
   1. To make marks with a pen or pencil.
   2. To make characters which stand for ideas.
   3. To use a pen or pencil.
   4. To make marks on any kind of surface with any kind of an instrument which will express one's ideas so that another may understand them.
   5. To write a letter.

c. Definitions of a *buggy*.
   1. A buggy is black.
   2. A buggy is something to ride in.
   3. A buggy is a light, four wheeled vehicle, with or without a top or covering, designed for carrying two or three persons.
   4. A buggy is drawn by horses.
   5. A buggy may have rubber tires.

*Literary Interpretation*

For literary interpretation, two stanzas of poetry, VII, A and B, were used, the pupil to write the meaning of each in his own words. These poems are taken from a third reader and a second reader respectively, each from a different standard series published within a decade of the time of these tests.

Test VII

VII. A. Read carefully the following stanza, then write its meaning in your own words.

"This little rill, that from the springs
Of yonder grove its current brings,
Plays on the slope awhile, and then
Goes prattling into groves again,
Oft to its warbling waters drew
My little feet, when life was new."

B. Read carefully the following stanza, then write its meaning in your own words:

"Under the greenwood tree,
Who loves to lie with me,
And tune his merry note
Unto the sweet bird's throat,
Come hither, come hither, come hither;
Here shall he see
No enemy
But winter and rough weather."

[*Bonser*, '10, pp. 3–8]

Of the method of giving these tests, Dr. Bonser writes: "All of the tests were given by the writer or under his direct supervision . . . . The greatest care was used to preserve the most strict uniformity in making tests and it is believed that a high degree of success was attained in this.

"Pupils were given the printed papers containing the questions, one test at a time, face downward, upon their desks. Space was provided upon the papers for all answers. Pupils had been directed to get pencils ready for writing before papers were distributed. When all had received copies of the test, the children were told to turn the papers over and to write their names and ages at their last birthday at the top of the pages, but to make no other marks upon them until a signal to begin was given. The printed directions at the top of the papers were read aloud to the pupils and the signal to begin was at once given unless experience had indicated a need for some additional word of explanation which was given before the signal to begin. . . . When the first pupil to finish had completed his work, in all of the tests but that of IV, the opposites, all turned the papers over, face downward, and they were collected. For the opposites, two minutes were given for each test." [Bonser, '10, pp. 9–10.]

The test occupied two days separated by an interval.

### Scoring

"*Tests I and II.* For each problem in arithmetic, a grade of 2 was given for each correct solution. If a two-step problem, and one part was right, the other not, the grade given was 1. No detraction was made for inaccuracies in operations.

"*Test III.* In the filling of blanks, and the choice of words, a grade of 1 was given for each correct answer, 0 for each wrong.

"*Test IV.* For the opposites, 2 was given for the correct word, 1 when it was partly right in meaning, and 0 for wrong and omitted words.

"*Tests V and VI.* For choice of reasons and definitions, the scale used was as follows, the grade in each case being the algebraic sum:

V. A. Numbers 3, 6, and 8, each 3 points; 1, 2, 5, 7, and 9, each −1; 4 and 10, each −2.
B. 1, 3, 6, 7, and 8, each 2; 2, 4, 5, 9, and 10, each −2.
C. 2, 4, and 8, each 3; 1, 3, 7, 9, and 10, each −1; 5 and 6 each −2.
D. 1, 4, 6, 8, and 10, each 2; 2, 3, 5, 7, and 9, each −2.

VI. A. a. Number 3, 7 points; 4, 2; 1, −2; 2, −3; 5, −4.
b, 1, 2 points; 3, 5; 4, 1; 2 and 5, each −4.
c. 1, 6 points; 5, 3; 2, 3, and 4, each −3.
B. a. 2, 5 points; 3, 1; 5, 2; 1, and 4, each −4.
b. 2, 2 points; 4, 5; 5, 1; 1, and 3, each −4.
c. 2, 2 points; 3, 7; 1, 4, and 5, each −3.

"*Test VII.* From 0 to 10 on basis of estimated merit for each part.

"*Test VIII.* Spelling. Subtract 1 for each misspelled word from the arbitrary standard of 15 for each of the two sets of papers used." [Bonser, '10, pp. 16, 17.]

When each individual is thus scored for each test, and all his scores are added together, the different grades overlap enormously as shown in Table 12.

It should be borne in mind, however, that (except with the "opposite" test) the time allowed in each grade was not necessarily identical, each class being given such time as the quickest person in it required to complete the test. Dr. Bonser does not regard the time factor as of much consequence, in view of the nature of the tests, but it seems probable that the lower grades had longer time and so are credited with somewhat better relative scores than they would have obtained if all grades had been given in every test some constant time.

TABLE 12

THE FREQUENCY OF EACH DEGREE OF ABILITY IN REASONING IN THE CASE OF EACH GRADE

| ABILITY | NUMBER OF INDIVIDUALS | | | | |
|---|---|---|---|---|---|
| | Grade 4A | Grade 5B | Grade 5A | Grade 6B | Grade 6A |
| 20– 29 | 3 | | | | |
| 30– 39 | 7 | 1 | | | |
| 40– 49 | 6 | | | | |
| 50– 59 | 3 | 2 | 3 | | |
| 60– 69 | 8 | 1 | 2 | | |
| 70– 79 | 8 | 3 | 3 | 2 | |
| 80– 89 | 10 | 3 | | | 1 |
| 90– 99 | 15 | 3 | 7 | 1 | 1 |
| 100–109 | 15 | 4 | 5 | | |
| 110–119 | 12 | 17 | 5 | 5 | 2 |
| 120–129 | 12 | 14 | 9 | 3 | 1 |
| 130–139 | 20 | 21 | 7 | 8 | |
| 140–149 | 20 | 11 | 8 | 9 | 3 |
| 150–159 | 12 | 18 | 10 | 12 | 5 |
| 160–169 | 8 | 14 | 13 | 17 | 5 |
| 170–179 | 6 | 12 | 13 | 16 | 11 |
| 180–189 | 4 | 12 | 8 | 21 | 10 |
| 190–199 | 3 | 12 | 11 | 19 | 8 |
| 200–209 | 3 | 5 | 9 | 19 | 11 |
| 210–219 | 2 | 7 | 5 | 16 | 13 |
| 220–229 | 1 | 2 | 2 | 9 | 13 |
| 230–239 | 2 | 2 | 1 | 9 | 14 |
| 240–249 | 1 | | | 7 | 6 |
| 250–259 | | 1 | | 5 | 5 |
| 260–269 | | | 2 | 1 | |
| All degrees of ability | 181 | 165 | 123 | 179 | 109 |

Subject to this possible correction Table 12 reveals such facts as these:

171 or 94% of the 4A pupils are above the worst pupils of the 5B grade
162 or 90% " " " " " " 5A "
150 or 83% " " " " " " 6B "
143 or 79% " " " " " " 6A "

41 or 23% of the 4A pupils are above the mid-pupil of the 5B grade
27 or 15% " " " " " 5A "
13 or 7% " " " " " 6B "
9 or 5% " " " " " 6A "

The best of the 4A pupils makes a score three times as high as the worst pupils of the 6A.

90% of the 6A pupils are below the best pupil of the 4A grade
4% " " " mid-pupil " "

The difference of one half grade from the next (*i. e.* 4A from 5B, 5B from 5A, 5A from 6B, and 6B from 6A) is, on the average, only one-tenth of the difference between the lowest and the highest pupil in any one grade. It we take the highest 109 of the 757 pupils, only 46 of them will be in the highest of the five half grades; 6 of them will be in the lowest of the five, 9 will be in the next to lowest.

That is, the result of the actual school grading is to pick the most able for the highest grade hardly four times in ten, and to put one out of twenty of the most able in a grade two years below the highest of the five. If we take the 123 who, for ability, should be in the middle or 5A half grade, we find only a fourth of them there.

If we drew at random 109 boys and girls from the 757 in all these grades to make up the 6A, *this absolutely random drawing* would differ from the 4A grade by half as much as does the group picked out administratively as two years in advance of it.

Great variability within one school grade and overlapping by it of the grades on either side has been found in every careful test of the abilities of school children. Indeed I unhesitatingly assert that a month's test in respect to the ability to do the specific intellectual work of the school course of study would show a similar, though perhaps not so great, variability and a similar overlapping. If, that is, all the 757 pupils should be tested for six months with 6A work, there would be many of the 4A pupils who would outdo many of the 6A pupils. So also, if all of the group were set at 4A or 5B work, many of the 6A pupils would be

inferior to many of the 4A pupils. For any intellectual task or combination of tasks, whether a psychologist's tests, a common-sense problem, or a series of school tests in history, arithmetic, spelling or what not, the groups got by the school's promotion system will be found to overlap each other enormously. When the task is one of amount of knowledge the overlapping will be less than here where power to use knowledge counts largely, but it will still exist, and in a degree that will surprise conventional believers in the sanctity of school grades as measures of scholarly achievement. The conventional opinions of school officers and teachers overweight the importance of the instruction given grade by grade. They promote unfit children because they fancy that these children, having had once, twice or three times over the supposedly valuable instruction of a given grade, must be fit for the next. They refuse to permit gifted children to skip grades because they fancy that the loss of any fraction of this supposedly valuable instruction must cause some grave injury or risk. Even the most sagacious are not wholly free from this superstitious taboo on rational judgment of children's ability by what they can actually do. So school gradation and promotion are far from being measures of intellectual merit pure and undefiled.

It is not here claimed that gradation and promotion should be for intellectual merit alone. Physiological maturity, childishness of interests, faithful effort, and many other criteria are more or less defensible. The gifted pupil may be the gainer by working half as hard or doing the work twice as well, rather than progressing twice as fast. The pupil stupid at the tasks of the course of study may be better off in failing at sixth grade work than in succeeding in third grade work. The point is that gradation and promotion should not *pretend to be* for intellectual merit when they are not, and should be efficiently managed consequences of *some* rational principles, not of an inheritance of superstitious

prejudices bequeathed by a generation that knew nothing of the individual differences that characterize the human species.

Lest any reader fancy that the great individual differences found within the same grades were due to age or maturity, I assure him that this is far from the case. Ages will be found to overlap as do grades, and even more.

## § 8. The Social and Economic Status of Pupils

This country's great contribution to educational practice is the public high school, providing boys and girls from thirteen to nineteen with free education and free preparation for professional schools, technical schools and colleges.

That a fifth to a third of all children go to high school for at least a time is a sign of the economic prosperity of the country which permits so many children to be freed from productive labor for so long. But it is also found upon investigation to be a sign of strong intellectual interests in very many boys and girls who partially or entirely support themselves while continuing their studies, and to be a sign of a family devotion in working and enduring to enable a child or younger brother to stay in school, which is one of the noblest qualities in American life to-day.

Teachers should not complain of the lack of "culture" and insufficient devotion to lesson-getting on the part of a high school pupil until they have learned the limitations of the social environment from which he comes and the conditions under which he has to work. Let the reader consider the repeated drama of struggle and sacrifice implied in the facts as to father's occupation and family expense for rental in the case of a random picking of a thousand boys and girls who entered New York City high schools in February, 1906.

There are, amongst these fathers, as many compositors as there are doctors, lawyers, clergymen and teachers combined. There are nearly twice as many "tailors"—that is, workers on garments. There are as many waiters as there are architects; as many barbers as there are civil and electrical engineers; as many janitors as there are dentists and editors together.

The policemen, carpenters, masons, plumbers, metal workers, painters, compositors and firemen outnumber the doctors, lawyers, clergymen and teachers five to one. Coachmen, street cleaners, elevator men, Turkish-bath attendants, watchmen and laundry workers send sons to the high school. Coachmen, elevator men and watchmen send as many as clergymen and teachers.[1]

Of the economic condition of the families as shown by the rent paid, Dr. Van Denburg writes:

"Our study of the rents paid by the parents of the high school pupils, incomplete as it is, yet furnishes some of the most surprising information which the whole investigation has yielded. Only 420 homes were visited out of a thousand so marked for investigation. Lack of time and money combined to prevent a complete canvass.

"The method followed in the majority of cases was to visit the house, explain that the investigator was making a study of rents and ask the actual rents paid by the tenant. In most cases the janitor gave the information willingly. In only a few cases was it necessary to pose as a prospective tenant or to visit the renting agent. If any errors resulted from this method it will probably be that in some cases the figures are too high as the 'rent asked' as it is known in New York often exceeds the 'rent paid' by actual lessees.

"In our selection of homes to be visited certain localities were selected such as, in Manhattan the middle and upper West Side, the lower East Side, Harlem, the lower West Side. In Brooklyn, Williamsburg, Flatbush, and the Park Slope, were selected. Home addresses were tabulated by localities and wherever a large number of addresses were found to come within an area of ten blocks or so square the rents were looked up.

[1] For a full account of the occupations of fathers and also of older brothers and sisters see the tables on pages 39 to 48 of *Causes of Elimination of Students in the Public Secondary Schools of New York City*, by J. K. Van Denburg, 1911.

"It was practically impossible to visit scattered homes in the Bronx, Coney Island section, or Staten Island or in sections where a half day's work would even at the expense of many car-fares give less than a dozen rentals as the result.

"The rents were originally recorded in two different numbers, the lowest and the highest asked in the tenement, flat or apartment house. These two figures were then averaged and the rent recorded in our tables according to the multiple of five, which it most nearly approached. For example; rents from $10 to $18 would average $14, and appear in our tables as $15. Rents $14 to $20 would average $17 and also be recorded as $15. Thus it will be seen that extreme accuracy is not pretended but merely a trustworthy approximation of the money paid each month by the families under observation.

"Rent as an indication of a family's financial condition must also take into consideration several points we did not have time to consider. For example, a family of three paying twenty dollars a month for three rooms may represent an entirely different financial condition from that which is shown by a family of six paying twenty dollars for three rooms. It is not only the rent itself, but the number of rooms and the number in the family that must be considered.

"Any scientifically accurate study of rents as an indication of a family's financial responsibility must include among other things:

1. Rent actually paid.
2. Number of rooms.
3. Number of self-supporting (rent-paying grown children living at home).
4. Number of children in school.
5. Number of 'roomers' who sublet rooms or beds.

"However, with all these data omitted, we can still trust our figures as maximum rentals very confidently, because all the

five items mentioned above except No. 4 tend to lower the net rent and to enable a family to live in a tenement or flat where *more* rent is charged than the same family would be able to afford on the basis of the father's wages alone.

"Our figures, especially those recorded as below twenty dollars may then be considered as erring only on the side of being too high, rarely if ever too low. For our purposes they may be accepted as fairly accurate *maximum* figures rather than true averages for the homes visited." ['11, pp. 79f.]

The essential facts found by Dr. Van Denburg appear in Table 13, which shows at a glance the sort of homes from which the city's high-school pupils come. In reading the table it should be borne in mind that, roughly, a fifteen-dollar rental means an unheated and badly ventilated space, ten feet by forty—that is, practically the lowest grade three or four-room tenement in the cheapest quarters of Manhattan or Brooklyn. A twenty-five-dollar rental means in Manhattan a space little or no larger, but not so dark, dirty, or lacking in toilet conveniences. In some parts of the outlying boroughs a twenty-five-dollar rental means half of a ten or twelve-room house or a tenement twelve feet by fifty.

Such homes are the best the parents can provide for three-quarters of these pupils. In them there will, of course, be no separate room for the high-school pupil to study or sleep in. No money can well be spent for books. There is always work, especially for the girls, in getting meals, "minding" younger children, and other household duties, for a servant is unknown in these homes. The bare facts of Table 13 tell to one who will reflect on their meaning a poignant story of appreciation and sacrifice.

TABLE 13

THE RELATIVE FREQUENCIES OF FAMILIES PAYING VARIOUS AMOUNTS FOR RENT, IN THE CASE OF FAMILIES SENDING CHILDREN TO NEW YORK PUBLIC HIGH SCHOOLS

| QUANTITY<br>Approximate Monthly Rental in Dollars | FREQUENCY<br>Numbers of Families per Thousand |
|---|---|
| 10 | 79 |
| 15 | 367 |
| 20 | 81 |
| 25 | 181 |
| 30 | 38 |
| 35 | 79 |
| 40 | 12 |
| 45 | 52 |
| 50 | 7 |
| 55 | 14 |
| 60 | 12 |
| 65 | 10 |
| 70 | |
| 75 | 5 |
| 80 | 2 |
| 85 | 7 |
| 90 | 12 |
| 95 | |
| 100 | 19 |
| 105 | |
| 110 | 12 |
| 115 | |
| 120 | 5 |
| 125 | |
| 130 | |
| 135 | |
| 140 | 5 |
| 145 | |
| 150 | 2 |

BY COARSER GROUPING

| Rental | Per Cent of Families |
|---|---|
| $10–$ 25 | 71 |
| $30–$ 45 | 18 |
| $50–$ 65 | 4 |
| $70–$ 85 | 2 |
| $90–$105 | 3 |
| $110 and over. | 2 |

# PART II

## STUDIES OF THE TEACHING STAFF

## § 9. The Causes and Conditions of Efficiency in Teaching

The first student of education to measure the conditions of efficiency in teaching, so far as the writer knows, was Dr. J. L. Meriam, whose monograph on *Normal School Education and Efficiency in Teaching* ['05] includes reports on the relation of efficiency in teaching to: (1) scholarship during the normal school course, (2) rank in practice teaching during that course, and (3) length of experience. The facts for (1) and (2) almost exclusively, and for (3) exclusively, concern teachers in elementary schools. I give first the facts for (1) and (2).

Since the teachers were widely scattered and comprise the graduates (of '98–'02 inclusive) from five normal schools, usable ratings for efficiency could not be obtained from their principals, superintendents and fellow teachers.

"Another method was taken. Principals of normal schools usually follow quite closely the work of their graduates.

"The estimate of such men is probably the best available mark for teaching efficiency. This is the mark used in this study.

"In selecting the individuals, the roll of classes graduating between 1898 and 1902, inclusive, was taken. The individuals were taken in order, in so far as the principal of the school had followed the work of the graduate sufficiently to be ready to estimate the efficiency of the teaching. All others were discarded." [Meriam, '05, p. 59.]

The marks for scholarship and for practice teaching were both taken from the school records. These measures are all, as Dr. Meriam points out, subject to errors of opinion, but it is best to note first what they show when so treated as to add no new errors, and to discuss later whatever modifications or insecurities need comment.

Taking these marks as true measures, the following coefficients of correlation [1] were found:

| | | | | | |
|---|---|---|---|---|---|
| Efficiency in teaching | with | practice teaching | | | .39 |
| " | " | " | " | psychology | .37 |
| " | " | " | " | history and principles of education | .28 |
| " | " | " | " | methods of teaching math., sci., hist., and English | .29 |
| " | " | " | " | academic courses in math., sci., hist., and English | .22 |

The gross amounts of these correlations may all be too low or, though this is unlikely, all too high, but their mutual relations will not be greatly altered. The main source of error is, of course, the reliance upon the opinions of the principals of the normal schools as to the efficiency of these teachers. This source of error operates in two ways. First, in so far as a principal simply *blunders*, through ignorance, carelessness, or a random collection of prejudices, the effect is *to make all the obtained correlations lower than they would be with perfectly just ratings*. Second, in so far as the principal is biased in his judgment of individuals' teaching efficiency by the impression he got from their scholarly work, or work in practice teaching, when they were students, the obtained correlation in question will be *higher* than it would be with perfectly just ratings.

Another source of error is that the marks, especially when given on a coarse scale (such as A, B, C, D, E, F, or 1, 2, 3, 4, 5; or *excellent*, *good*, etc.) and for a single course, do not perfectly measure scholarship or the real ability shown in the student's

[1] These coefficients of correlation are numbers, measuring the closeness of correspondence between a teacher's rank amongst his fellows in one of the traits listed and, his rank in the other trait listed. +1.00 means *perfect correspondence*—that each individual occupies exactly the same relative position in the two traits; — 1.00 means that the positions are exactly reversed, the highest individual in the one trait being the lowest in the other; 0 means a haphazard, random relation between the two, so that the best person in the one trait is as likely to be worst as best in the other. For a fuller account see the chapters on the measurement of relations in Thorndike's *Mental and Social Measurements*.

practice teaching. The effect of this is to make all the obtained correlations *lower* than they would be if normal school marks each and all represented omniscient justice.

The effect of random inaccuracies in the original measures upon correlations computed from them was not known at the time when Dr. Meriam did his work, so that means to calculate the necessary allowances were not taken by him. It is however probable that with perfectly just measures of all the traits the correlations would be:

| | |
|---|---|
| Efficiency in teaching with practice teaching | between .35 and .60 |
| " " " " psychology | " .35 " .60 |
| " " " " history and principles of education | " .25 " .50 |
| " " " " methods of teaching math., sci., hist., and English | " .25 " .50 |
| " " " " academic courses in math., sci., hist., and English | " .25 " .50 |

In any case it is clear that scholarship is one contributor to efficiency in teaching and that it is somewhere nearly as good a sign of it as ability in practice teaching is.

*The Relation of Efficiency in Teaching to Length of Experience*

Five hundred and seven teachers in certain elementary schools in New York and Massachusetts, the length of whose teaching experience was known, were graded for efficiency in teaching, each group by the principal of the school.

" The ranking of the teachers of the 33 schools differed much in the number of groups into which the corps of teachers was divided. For example, one principal divided his teachers into a first, second and third rank. Others made 5, 8, 12 and even 22 groups. In this last group were 22 teachers, who were thus arranged in perfect serial order from the most efficient teacher to the least efficient teacher." . . .

To use all these together conveniently they were regrouped into five grades by the method shown below, in Table 14.

"Here the principle used was that the extremes should be disturbed as little as possible. Thus, in an original grouping into 10 we now have: first rank remains first rank; second and third become second rank; the fourth to the seventh become third rank; eighth and ninth become fourth rank; and the tenth become fifth rank." [Meriam, '05, p. 106]

TABLE 14

TABLE OF REGROUPING

| Original groups | First rank | Second rank | Third rank | Fourth rank | Fifth rank |
|---|---|---|---|---|---|
| 5 | 1 | 2 | 3 | 4 | 5 |
| 6 | 1 | 2 | 3– 4 | 5 | 6 |
| 7 | 1 | 2 | 3– 5 | 6 | 7 |
| 8 | 1 | 2 | 3– 6 | 7 | 8 |
| 9 | 1 | 2–3 | 4– 6 | 7– 8 | 9 |
| 10 | 1 | 2–3 | 4– 7 | 8– 9 | 10 |
| 11 | 1 | 2–3 | 4– 8 | 9–10 | 11 |
| 12 | 1 | 2–4 | 5– 8 | 9–11 | 12 |
| 13 | 1 | 2–4 | 5– 9 | 10–12 | 13 |
| 14 | 1 | 2–4 | 5–10 | 11–13 | 14 |
| 15 | 1 | 2–5 | 6–10 | 11–14 | 15 |
| 18 | 1 | 2–6 | 7–12 | 13–17 | 18 |
| 19 | 1 | 2–6 | 7–13 | 14–18 | 19 |
| 20 | 1 | 2–6 | 7–14 | 15–19 | 20 |
| 22 | 1–2 | 3–7 | 8–15 | 16–20 | 21–22 |

"What do our data indicate as to the relation of experience to relative standing in teaching efficiency? We have such questions as these: Does the teacher's standing increase with her experience, *i. e.* do the older teachers stand foremost, or is there a certain amount of experience at which a teacher is in her 'prime of life?'

"In this study I have divided the thirty-three schools into two divisions: In the first division I have rearranged into five groups all schools already in five or more groups; in the other I have arranged into three groups those schools already in three or four

groups. In the former group are 387 cases; in the later, 117 cases —making 504 cases considered. The number of years' experience in teaching is given in nine groups, as follows: 0, 1, 2, 3, 4, 5, 6 to 10, 11 to 15, 16 and over. The following table [Table 15] gives the distribution. The numbers at the top give the number of years' experience; those at the left indicate the rank of the teachers; the others show the individual cases in each.

TABLE 15

TEACHING EFFICIENCY IN RELATION TO EXPERIENCE

| | AMOUNT OF EXPERIENCE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Rank | 16+ | 15 to 11 | 10 to 6 | 5 | 4 | 3 | 2 | 1 | 0 Totals |
| 1 | 9 | 16 | 18 | 2 | 2 | 1 | 2 | | 50 |
| 2 | 16 | 16 | 28 | 10 | 6 | 4 | 7 | 4 | 91 |
| 3 | 16 | 14 | 51 | 10 | 12 | 13 | 10 | 12 | 1 139 |
| 4 | 14 | 15 | 18 | 6 | 3 | 6 | 5 | 10 | 77 |
| 5 | 5 | 7 | 10 | | 1 | 2 | 1 | 4 | 30 |
| Total | 60 | 68 | 125 | 28 | 24 | 26 | 25 | 30 | 1 387 |

" When turned into percentages the entries in the above table give the following (Table 16):

TABLE 16

AMOUNT OF EXPERIENCE

| Rank | 16+ | 15 to 11 | 10 to 6 | 5 | 4 | 3 | 2 | 1 | 0 Totals |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15. | 23.6 | 14.4 | 7. | 8.3 | 3.8 | 8. | | 13. |
| 2 | 26.7 | 23.6 | 22.4 | 35.8 | 25. | 15.4 | 28. | 13.3 | 23.5 |
| 3 | 26.7 | 20.6 | 40.8 | 35.8 | 50. | 50. | 40. | 40. | 100. 36. |
| 4 | 23.3 | 22. | 14.4 | 21.4 | 12.5 | 23.1 | 20. | 33.3 | 20. |
| 5 | 8.3 | 10.2 | 8. | | 4.2 | 7.7 | 4. | 13.3 | 7.5 |

" That is, 15 per cent of those who taught sixteen years or more are in the first rank; 13.3 per cent of those with one year's experience are in the lowest rank.

" The true standing in each group may be well seen from the median of each group; that is, the point which marks the dividing line between the better half and the poorer half in each group of teachers. These medians are calculated upon the series of five

groups according to teaching efficiency. I omit the single case with 0 years' experience.

| 16+ | 11 to 15 | 6 to 10 | 5 | 4 | 3 | 2 | 1 | Totals |
|---|---|---|---|---|---|---|---|---|
| 2.81 | 2.63 | 2.82 | 2.70 | 2.83 | 3.11 | 2.85 | 3.40 | 2.88 |

" A treatment of the other 117 cases in three groups gives practically the same results. The following (Table 17) is the table of distribution:

TABLE 17

AMOUNT OF EXPERIENCE

| Rank | 16+ | 11 to 15 | 6 to 10 | 5 | 4 | 3 | 2 | 1 | 0 | Totals |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 9 | 11 | 4 | 3 | 2 | 1 | | | 38 |
| 2 | 6 | 10 | 19 | 2 | 2 | 4 | 2 | 4 | 5 | 54 |
| 3 | 3 | 3 | 9 | | 1 | 1 | 1 | 6 | 1 | 25 |
| Totals | 17 | 22 | 39 | 6 | 6 | 7 | 4 | 10 | 6 | 117 |

The medians on the basis of a series of three are as follows:

| Experience | 16+ | 11 to 15 | 6 to 10 | 5 | 4 | 3 | 2 | 1 | 0 | Totals |
|---|---|---|---|---|---|---|---|---|---|---|
| Median rank | 1.58 | 1.70 | 1.95 | 1.25 | 1.50 | 1.87 | .2 | 2.66 | 2.10 | 1.88 |

" The Pearson formula for the index of correlation for the 387 cases with the better grading gives .097. This would be much smaller but for the group with one year of experience. Apart from that group there is practically a zero correlation. It must be said, then, in answer to the relation between experience and teaching efficiency that beyond the first year of experience it is practically *nil*. After the first year the amount of experience is not an important criterion for efficient teaching in the elementary schools. The importance of this fact, if it is confirmed by later researches, to administrators of school systems is obvious." [Meriam, '05, pp. 108–111, *passim*]

The relation of efficiency in teaching to length of experience in the case of high-school teachers was studied by Thorndike ['09]

using the salaries received by teachers in private schools in the same city under free competition as measures of their efficiency.

The private schools of a single community presumably give salaries in a fairly close proportion to what they judge to be efficiency in teaching—that is, approximately free competition obtains and the salary is to some extent a measure of the teacher's efficiency. The closeness of the approximations will depend upon the extent to which the authorities of these schools are governed by economic rather than sentimental or idealistic considerations in adjusting salaries and upon the extent to which their judgments of the efficiency of teachers are correct.

The differences in salary among teachers of the same sex in private secondary schools of the same community may then be taken as to some degree parallel to the differences in their teaching efficiency; and in so far as any two communities are alike in the cost of living and the attractiveness of life and in so far as there is competition between them for the services of teachers, the two may be treated as one for the purposes of this inquiry.

The data available are rather meager, and to utilize what there are fully would require an enormous expenditure of time. I have therefore studied the relation of salary to length of experience amongst teachers in private secondary schools in only the following five cases:

Men's salaries: Private secondary schools for boys in New York City.

Men's salaries: Private secondary schools for boys in Boston, Worcester, and Philadelphia.

Women's salaries: Private secondary schools for girls in New York City.

Women's salaries: Private secondary schools for girls in Boston and Cincinnati.

Men's salaries: Private secondary schools for boys or boys and girls in towns of Massachusetts and Connecticut.[1]

Making the comparisons separately for each of these groups and then measuring the general tendency of the fact in the five

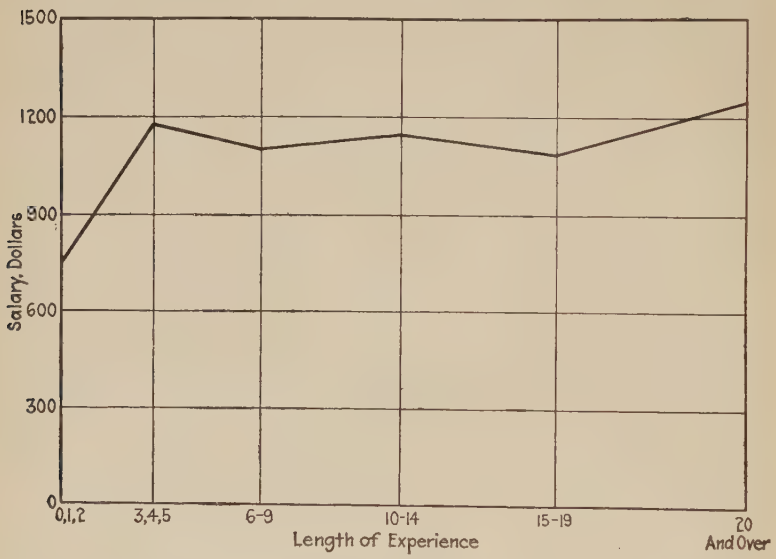



FIG. 8. The relation of salary to length of experience in the case of teachers in private secondary schools in communities alike in the value of the dollar (to a teacher.) The horizontal line gives the scale for length of experience in years. The vertical scale is for the amount of annual salary.

cases, we have the result shown in Figure 8, which relates the amount of salary to the amount of experience in teaching. So far as the data go, they support the hypothesis that the full effect of experience in teaching on efficiency in the work of a private

[1] In this case the towns are not alike in the cost of living, but as a rule the greater attractiveness of life in the more expensive towns is sufficient to make an approximate balance.

secondary school is reached in three years, the slight rise from twenty on being probably attributable to the higher wages for executive work as head of a department, or to the sentiment which leads private school authorities to maintain or increase salaries after long service, even though a more efficient person could be obtained for a less amount.

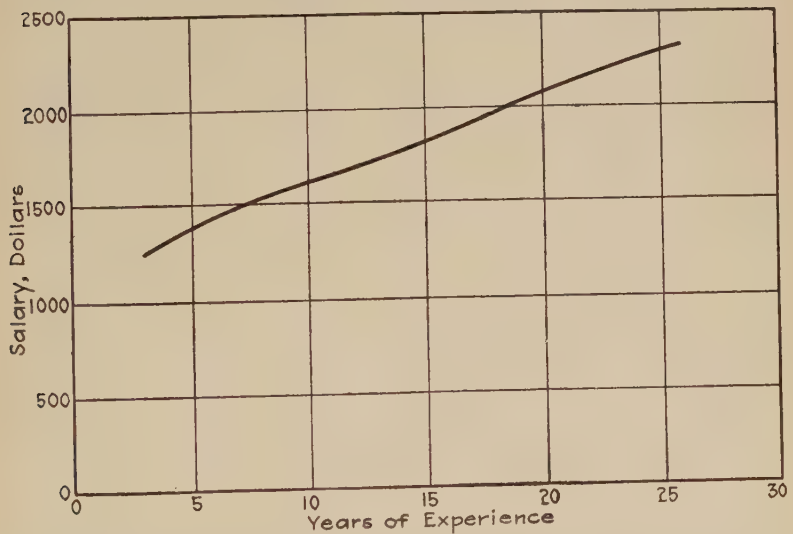



FIG. 9. The relation of salary to length of experience in the case of teachers in public high schools. Men teachers of New York, Boston, St. Louis and Chicago.

Unfortunately the private schools rarely sent the individualized data requisite for such a study, so that the measurement above made might undergo modifications of fairly large extent upon receipt of full information.

Such facts as appear in Figure 8 are in sharp contrast to those within the public system of a large city. In the latter it is customary to advance the salaries of those whose appointments are renewed, and also, though less often, to determine the amount

of the salary of a teacher entering the system from another city partly on the basis of the length of time he has taught. New York City is a notable case.

I show in Figure 9 the relation of salary to experience obtained by combining the four relations found in New York, Boston, St. Louis and Cleveland in the case of men teachers in public high schools. Figure 10 gives the same relation in the case of women teachers. The difference between the relation in these cases and what it is under free competition is obvious.

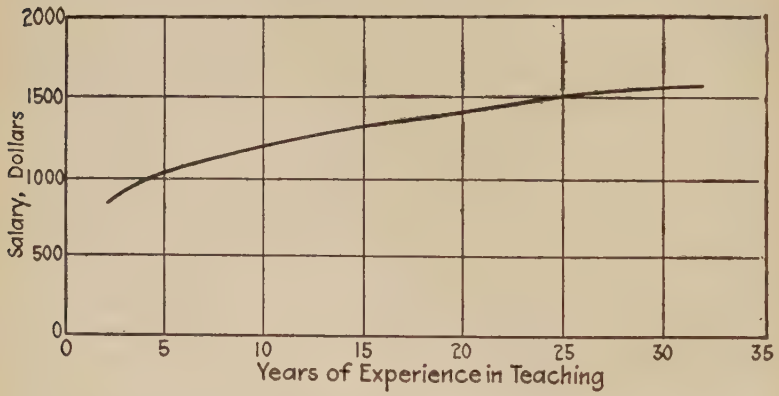



FIG. 10. The relation of salary to length of experience in the case of teachers in public high schools. Women teachers of Boston, St. Louis and Cleveland.

It may be well to warn ourselves that even if it were true that experience after the first four or five years does not greatly add to the efficiency of a public high school teacher, still it cannot be said that the customary practice in our large cities wastes money in paying for a false symptom of efficiency; for, even if the teachers of five years' experience equaled those of ten, it might still be wise to pay the latter more. In the first place, the salary schedule as a whole decides the teacher in his choice amongst positions. It is not a fixed $1,000 that he accepts, but $1,000

plus $100 advance annually up to $2,000. The advance with time is really a feature in the bargain. In the second place, it may be wise for a city to pay its teachers what will maintain a certain standard of living, rather than what will just purchase the required efficiency; and on this principle the head of a family, at least, should be advanced with age or with some other still more accurate measure of the size of his family. In the third place, the premium on experience has the administrative advantage of encouraging the adoption of teaching as a permanent profession and of preventing frequent changes in the local teaching staff. It is also free from the difficulties of competition for promotion on the grounds of pure merit.

It is well, on the other hand, to note that the premium paid for experience may deprive a city of the best services obtainable for the price it has to pay, may retain the less competent too surely, and may discourage the entrance to and continuance in the profession of that very desirable class who would prefer to work under a system of competitive promotion by merit.

### *The Relations of Length of Experience and of Length of Education to Amount of Salary*

If one does not seek to restrict the localities used in the comparison to those in which the same salary is equally desirable, the number of cases may of course be greatly increased, to such an extent, in fact, that the relation of salary to length of experience may be studied separately for teachers of each different amount of education. The relation of salary to the amount of education for teachers of each amount of experience may also be determined.

I have so studied all the individualized reports from the public high schools of Ohio, Illinois and Wisconsin. It must be borne in mind that the large schools rarely sent in individualized reports and so are rarely included in these data. This is, of course,

an advantage in that it makes the data less diverse with respect to the cost of living and the value of life.

The computations start with preliminary tables like the following (Table 18):

TABLE 18

TABLE OF FREQUENCIES OF SALARIES OF TEACHERS OF 8 YEARS EDUCATION AND 0, 1, OR 2 YEARS OF EXPERIENCE IN TEACHING (WOMEN IN OHIO)

| Quantity (Annual Salary) | Frequency (Number of Teachers) | Quantity (Annual Salary) | Frequency (Number of Teachers) | Quantity (Annual Salary) | Frequency (Number of Teachers) |
|---|---|---|---|---|---|
| $399 | 4 | $550 | 1 | $695 | 1 |
| 405 | 2 | 560 | 1 | 700 | 1 |
| 450 | 11 | 570 | 1 | 720 | 2 |
| 465 | 1 | 585 | 1 | 750 | 1 |
| 475 | 2 | 590 | 1 | 780 | 2 |
| 485 | 1 | 600 | 5 | 800 | 5 |
| 495 | 4 | 630 | 3 | 1,000 | 1 |
| 500 | 4 | 650 | 1 | | |
| 540 | 8 | 675 | 2 | | |

There are 528 such tables, but with some blanks (3 States x 2 sexes x 11 lengths of education x 8 lengths of experience, namely: 0–2, 3–5, 6–9, 10–14, 15–19, 20–24, 25–29, 30 and over). I shall refer to these 528 tables as the original tables.

From a thorough study of these tables it is clear that the relations to be investigated are substantially the same in the three States. I therefore combine the data from the three States.

A study of the same tables also shows that there is no sure appreciable difference as regards frequency of salaries for teachers of 0, 1, 2, and 3 years of education beyond the elementary schools. I therefore combine the data for these four groups. The data for ten years of education are too few to give reliable determinations. Hence I omit them.

The data for the groups of "25–29" and "30 and over" years

of experience are too few to give reliable determinations, and there is surely no great difference between these two groups. So I combine these also.

The 98 tables resulting furnish the material for answering any questions about the relationship of salary to amount of experience and to amount of education in the case of these groups of teachers, and for comparisons with the status of this relationship at any date in the future.

These 98 tables will be found in full in section IX of No. 404 of the Bulletins of the United States Bureau of Education, "The Teaching Staff of Secondary Schools in the United States," by Edward L. Thorndike. I give here the tables for men and women of four years, and of eight years, of education beyond the elementary school.

It is practically impossible to summarize in words the relationship between salary and length of experience, because of its complexity.

There is no uniform tendency for a given difference in length of experience to be accompanied by a constant gross or percentile difference in salary. The upper range of salaries varies with experience more than the average salary. The relation is different in the case of those of much and those of little education. There are other eccentricities. For an adequate measurement of the relation one would have to repeat every detail of the 98 tables. I shall state only those general facts which are of most significance to educational administration. These are as follows:

### *The Relation of Salary to Experience in the Case of Men Teachers*

The high-school authorities in the three States under consideration pay the average male high-school teacher on the average $28 (*i. e.* 4 per cent of the usual salary for the first three years of teaching) for each year of experience from 1 to 12 years, $8 a

## TABLE 19

RELATIONS BETWEEN SALARY, AMOUNT OF EDUCATION, AND EXTENT OF EXPERIENCE OF MALE HIGH-SCHOOL TEACHERS IN OHIO, ILLINOIS, AND WISCONSIN

MEN OF 4 YEARS OF EDUCATION BEYOND ELEMENTARY SCHOOL

| SALARIES | YEARS OF EXPERIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 to 2 | 3 to 5 | 6 to 9 | 10 to 14 | 15 to 19 | 20 to 24 | 25 and over |
| Under $400 | ..... | 2 | 1 | ..... | ..... | ..... | ..... |
| $400 to $499 | 4 | 10 | 5 | 4 | 1 | 1 | 1 |
| $500 to $599 | 7 | 8 | 4 | 4 | 3 | 2 | ..... |
| $600 to $699 | 4 | 11 | 11 | 11 | 4 | 1 | 5 |
| $700 to $799 | 2 | 2 | 6 | 3 | 6 | 2 | 1 |
| $800 to $899 | ..... | 3 | 2 | 6 | ..... | 3 | ..... |
| $900 to $999 | ..... | ..... | 4 | 2 | 1 | 1 | 1 |
| $1,000 to $1,099 | ..... | 4 | 3 | 2 | 3 | 1 | 1 |
| $1,100 to $1,199 | ..... | ..... | ..... | 2 | ..... | ..... | ..... |
| $1,200 to $1,299 | ..... | 1 | 2 | 2 | ..... | ..... | ..... |
| $1,300 to $1,399 | ..... | ..... | ..... | 4 | 1 | 1 | 1 |
| $1,400 to $1,499 | ..... | ..... | ..... | 2 | 2 | 1 | 4 |
| $1,500 to $1,999 | ..... | ..... | ..... | 2 | 1 | 2 | 2 |
| $2,000 to $2,499 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| $2,500 and over | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

MEN OF 8 YEARS OF EDUCATION BEYOND ELEMENTARY SCHOOL

| SALARIES | YEARS OF EXPERIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 to 2 | 3 to 5 | 6 to 9 | to | 15 to 19 | 20 to 24 | 25 and over |
| Under $400 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| $400 to $499 | 15 | 2 | 1 | ..... | 1 | ..... | ..... |
| $500 to $599 | 23 | 13 | 6 | 3 | 1 | 2 | 1 |
| $600 to $699 | 35 | 23 | 15 | 1 | 1 | 1 | 2 |
| $700 to $799 | 22 | 27 | 19 | 7 | 5 | 2 | 2 |
| $800 to $899 | 15 | 25 | 16 | 10 | 8 | ..... | 1 |
| $900 to $999 | 1 | 27 | 18 | 12 | 3 | 4 | 1 |
| $1,000 to $1,099 | 3 | 20 | 23 | 8 | 8 | 6 | 4 |
| $1,100 to $1,199 | ..... | 4 | 8 | 7 | ..... | 2 | ..... |
| $1,200 to $1,299 | 2 | 8 | 9 | 11 | 5 | 2 | 1 |
| $1,300 to $1,399 | ..... | 3 | 7 | 5 | 4 | 1 | ..... |
| $1,400 to $1,499 | ..... | 2 | 3 | 8 | 3 | 2 | ..... |
| $1,500 to $1,999 | ..... | ..... | 10 | 20 | 13 | 11 | 6 |
| $2,000 to $2,499 | ..... | ..... | ..... | 2 | 1 | 3 | 5 |
| $2,500 and over | ..... | ..... | ..... | 1 | 2 | 3 | 4 |

TABLE 20

RELATIONS BETWEEN SALARY, AMOUNT OF EDUCATION, AND EXTENT OF EXPERIENCE OF FEMALE HIGH-SCHOOL TEACHERS IN OHIO, ILLINOIS, AND WISCONSIN

WOMEN OF 4 YEARS OF EDUCATION BEYOND ELEMENTARY SCHOOL

| SALARIES | YEARS OF EXPERIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 to 2 | 3 to 5 | 6 to 9 | 10 to 14 | 15 to 19 | 20 to 24 | 25 and over |
| Under $400 | 2 | 2 | 1 | ..... | ..... | 1 | ..... |
| $400 to $449 | 3 | 3 | 2 | 1 | ..... | ..... | ..... |
| $450 to $499 | 3 | 1 | 4 | 1 | ..... | ..... | ..... |
| $500 to $549 | 3 | 7 | 2 | 1 | 1 | 2 | 1 |
| $550 to $599 | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| $600 to $649 | 2 | 5 | ..... | 1 | 2 | ..... | 2 |
| $650 to $699 | ..... | ..... | 1 | 1 | 1 | ..... | ..... |
| $700 to $749 | 1 | 2 | ..... | 3 | ..... | 2 | 2 |
| $750 to $799 | ..... | ..... | 1 | ..... | 2 | 1 | 1 |
| $800 to $849 | 1 | ..... | ..... | ..... | ..... | ..... | ..... |
| $850 to $899 | ..... | ..... | ..... | ..... | ..... | 1 | ..... |
| $900 to $949 | 1 | ..... | 2 | ..... | ..... | 1 | ..... |
| $950 to $999 | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| $1,000 to $1,099 | ..... | ..... | ..... | 1 | ..... | ..... | ..... |
| $1,100 to $1,199 | ..... | ..... | 1 | ..... | 1 | ..... | ..... |
| $1,200 to $1,299 | ..... | ..... | ..... | ..... | 1 | 2 | 6 |
| $1,300 to $1,399 | ..... | ..... | ..... | 2 | 3 | 3 | ..... |
| $1,400 to $1,499 | ..... | ..... | ..... | ..... | 2 | 1 | 1 |
| $1,500 to $1,999 | ..... | ..... | ..... | ..... | ..... | 1 | 6 |
| $2,000 and over | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

WOMEN OF 8 YEARS OF EDUCATION BEYOND ELEMENTARY SCHOOL

| SALARIES | YEARS OF EXPERIENCE | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 to 2 | 3 to 5 | 6 to 9 | 10 to 14 | 15 to 19 | 20 to 24 | 25 and over |
| Under $400 | 3 | ..... | ..... | ..... | ..... | ..... | ..... |
| $400 to $449 | 9 | ..... | ..... | 1 | ..... | ..... | ..... |
| $450 to $499 | 50 | 11 | 1 | 1 | ..... | ..... | ..... |
| $500 to $549 | 52 | 29 | 5 | ..... | 1 | 2 | ..... |
| $550 to $599 | 27 | 15 | 6 | 3 | ..... | ..... | ..... |
| $600 to $649 | 34 | 38 | 14 | 3 | ..... | 1 | 2 |
| $650 to $699 | 16 | 31 | 25 | 1 | 2 | ..... | ..... |
| $700 to $749 | 8 | 28 | 22 | 17 | 3 | ..... | ..... |
| $750 to $799 | 4 | 17 | 16 | 2 | 3 | 1 | ..... |
| $800 to $849 | 7 | 15 | 19 | 5 | 3 | ..... | ..... |
| $850 to $899 | 1 | 2 | 7 | 4 | 3 | 1 | ..... |
| $900 to $949 | 2 | 3 | 10 | 6 | 1 | 2 | ..... |
| $950 to $999 | ..... | 1 | 4 | ..... | ..... | 1 | ..... |
| $1,000 to $1,099 | 1 | 9 | 6 | 2 | 2 | ..... | 2 |
| $1,100 to $1,199 | ..... | 2 | 5 | 1 | 1 | ..... | 1 |
| $1,200 to $1,299 | ..... | 2 | 4 | 9 | ..... | ..... | ..... |
| $1,300 to $1,399 | ..... | ..... | 6 | 9 | 3 | 1 | 3 |
| $1,400 to $1,499 | ..... | ..... | 2 | 7 | 5 | 3 | 1 |
| $1,500 to $1,999 | ..... | ..... | ..... | 3 | 2 | 5 | 4 |
| $2,000 and over | ..... | ..... | ..... | ..... | 1 | 1 | 1 |

year for each year from 12 to 22, and little or nothing for each year thereafter. The superior teachers show larger differences with experience. The men who have had the most education not only are paid more at the start, but also show larger differences with the first 10 or 15 years of experience, those with 8 years beyond the elementary school showing differences with experience that are about five times as large as those of men with 0–3 years, over twice as large as those of men with 4–6 years, and one and a half times as large as those of men with 7 years.[1] The differences between the salaries of those with 10–15 and those with 20–30 years of experience seem to be on the average the same for those of little and those of much education.

### *The Relation of Salary to Experience in the Case of Women Teachers*

The school authorities in the three States in question pay the average female high school teacher on the average $27 (*i. e.* 5 per cent of the usual salary for the first three years of teaching) for each year of experience from 1 to 22 and apparently even to 30 or over. The superior teachers show larger differences with experience. The women who have had the most education not only are paid more at the start, but also show larger differences, not only for the first 10 or 15 years of teaching, as with men, but

[1] The somewhat awkward form of verbal statement used here and later is necessary to avoid giving the impression that the same person would receive the advances and discounts described if he had the increase in experience or education or the decrease in the latter corresponding to the differences described. Such may be true, but it does not necessarily follow from our facts. For education and experience not only alter individuals from what they were or would have been, but also select individuals. The teachers who have taught 20 years are a selected group of those who have taught 2 years and their salaries need not be equal to what the latter would attain if they taught 18 years longer. The teachers who studied 8 years may be different by nature as well as by training from those who studied only 4 years.

throughout. Women with 8 years of education beyond the elementary school show differences with experience that are five times as large as those of women with 0 to 3 years, over twice as large as those of women with 4–6 years, and over one and a half times as large as those of women with 7 years.

### *The Relation of Salary to Length of Education*

It is also impossible to state the relation between salary and length of education adequately in words. There is again in this case no uniform tendency, though the eccentricities are here not so marked. There is also a special difficulty in that the increases from 0 to 9 years of education do not mean additions of equal amounts of the same thing. For instance, the group with 8 years of education are mostly college graduates, while the group with 6 years of education have rarely completed two years of a college course. The original tables tell the whole story, certain features of which I shall repeat in verbal form.

The high school authorities in the three States pay the average male high school teacher on the average $90 (or one-seventh of the usual salary for the first three years of teaching) less, if he is one year short of the standard 8 years; they pay him on the average $220 (or one-third of the usual salary for the first 3 years) less, if he is 3 years short of that standard; and $325 (or over half that salary) less, if he is 6 years short of that standard. For a year in addition to the standard they pay him on the average $90 more. All these differences are smaller for those of little experience in teaching and greater for those of much.

The corresponding figures for women teachers are $75, $150, and $275 less, for 1, 3, and 6 years short of the standard 8 years, and $45 more for 1 year over that standard. These amounts are, respectively, one-seventh, two-sevenths, over half, and one-eleventh of the usual salary for the first three years of teaching.

It is evident that school authorities reward the kind of man or woman who has secured a thorough education; and that, in so far as their practice is a natural selection of one means of securing efficient teachers, premiums for advanced education are desirable in formal salary schedules. The figures indeed suggest that the premiums now given in such formal salary schedules are too low in the case of education and too high relatively in the case of experience in teaching.

Neither experience in teaching nor amount of education is so important in determining relative salaries as the differences amongst teachers in other respects; that is, in native gifts and in the quality rather than the quantity of their education. That teachers of the same amount of experience and education vary enormously as to salaries is shown by every group recorded in the tables. For instance, of the men who have taught from ten to fourteen years and who had each 8 years education in advance of the elementary school, some receive four, and even five, times as much per year as others.

Dr. L. D. Coffman ['11] has measured these relations in the cases of a miscellaneous group made up very largely of elementary school teachers, from the United States as a whole. He writes:

"The salary paid teachers in general, particularly where free competition obtains, is one criterion or objective measure of their efficiency in general. Common observation and common sense teach us that in the case of numerous individuals and of certain communities and institutions, salaries cannot be regarded as true measures of efficiency. That they cannot is due: (1) to the operation of idealistic, sentimental, religious, political, blood-kin considerations; (2) to the unfair and unequal administration of municipal or commercial affairs in the distribution of moneys for the maintenance of the different forms of public protection and public service; and (3) to the lack of definite standards by which to judge teaching efficiency. Nevertheless it seems true as a

general proposition that differences in salaries in a given locality in either sex must be regarded as indicative of differences in teaching efficiency; and also differences in salaries among different localities, provided the communities compared have approximately equal standards of living and are of equal wealth, and competition among teachers is equally free, indicate different community estimates of teaching efficiency.

"No effort is made in the tables that follow to compare salaries in a given community or between given communities. The tables merely show what the general tendency is, to what extent salaries in general are influenced by experience. Supposing that the standards of living in the different places in this report do not differ radically, this general tendency becomes a fairly accurate registration of the value American people set upon experience. . . .

TABLE 21

TABLE SHOWING RELATION OF EXPERIENCE OF MEN TEACHERS TO SALARY

| SALARY | YEARS OF EXPERIENCE | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11–12 | 13–14 | 15–19 | 20–24 | 25–+ |
| $150 | 5 | 2 | 4 | | | | 1 | 1 | | | 1 | | 1 | | | |
| 200 | 5 | 9 | 2 | 6 | 2 | 2 | 1 | | | 1 | 1 | | | | 2 | |
| 250 | 29 | 12 | 5 | 7 | 6 | 3 | | 2 | 2 | 2 | | | 3 | 2 | | 4 |
| 300 | 30 | 13 | 10 | 6 | 4 | 4 | 5 | 2 | 2 | 3 | | 3 | 2 | 4 | 1 | 2 |
| 350 | 13 | 20 | 14 | 12 | 14 | 14 | 8 | 2 | 5 | 9 | 4 | 9 | 2 | 8 | 11 | 11 |
| 400 | 10 | 9 | 11 | 14 | 11 | 6 | 9 | 6 | 7 | 5 | 3 | 7 | 7 | 9 | 6 | 5 |
| 450 | 10 | 7 | 7 | 5 | 11 | 5 | 11 | 5 | 5 | 4 | 1 | 8 | 7 | 11 | 9 | 12 |
| 500 | 3 | 2 | 6 | 4 | 3 | 3 | 2 | 3 | 2 | 2 | 3 | 4 | 6 | 4 | 5 | 11 |
| 550 | 1 | 1 | 1 | 3 | 3 | 7 | 2 | 3 | 2 | 3 | 1 | 3 | 2 | 7 | 3 | 7 |
| 600 | 3 | 2 | 6 | 6 | 6 | 5 | 6 | 4 | 6 | 5 | 2 | 2 | 5 | 6 | 3 | 7 |
| 650 | 1 | 2 | 4 | 3 | 2 | 2 | 7 | 6 | 4 | 2 | 3 | 2 | 4 | 5 | 5 | 8 |
| 700 | 1 | 2 | 1 | 3 | 2 | 1 | 4 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 6 |
| 750 | | | 2 | 4 | | 2 | 2 | 1 | | | 2 | 3 | 3 | 2 | | |
| 800 | | 2 | 2 | 1 | 3 | 3 | 1 | 2 | | | 4 | 5 | 4 | 5 | 5 | 7 |
| 850 | | 1 | | | 2 | 1 | | | 1 | | | | 2 | 1 | | 1 |
| 900 | | 1 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 1 | | 2 | 4 | 6 | | 1 |
| 950 | | 1 | | | | | 2 | 1 | 3 | 1 | 1 | 4 | | 2 | | 3 |
| 1,000 | | 2 | 2 | 3 | 4 | 3 | 5 | 1 | 3 | 4 | 6 | 7 | 10 | 16 | 3 | 10 |
| 1,250 | | | | | 2 | 2 | 1 | 1 | | 3 | 3 | 4 | 3 | 5 | 4 | 6 |
| 1,500 | | | | | 1 | | 4 | | | | | | 2 | 7 | 4 | 4 |
| 1,750 | | | | | | | | | 1 | | 1 | 3 | 5 | 1 | 1 | 6 |
| 2,000 | | | | | | | | 1 | | | | | 1 | 2 | 5 | 2 |
| Total | 111 | 88 | 83 | 79 | 78 | 65 | 74 | 44 | 48 | 46 | 37 | 67 | 74 | 102 | 69 | 113 |
| Median | $328 | 370 | 430 | 430 | 459 | 485 | 550 | 517 | 525 | 488 | 692 | 592 | 675 | 680 | 558 | 632 |

" Table 21 shows that the 111 men teachers with no experience are receiving salaries ranging from $150 to $700; that 88 men teachers with one year of experience are receiving salaries ranging from $150 to $1,000, and so on. Table 22 reads in the same way for women.

TABLE 22

TABLE SHOWING RELATION OF EXPERIENCE OF WOMEN TEACHERS TO SALARY

| SALARY | YEARS OF EXPERIENCE | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11–12 | 13–14 | 15–19 | 20–24 | 25 + |
| $150 | 39 | 21 | 18 | 13 | 11 | 8 | 4 | 2 | 3 | | 1 | 1 | | | 2 | |
| 200 | 36 | 29 | 18 | 7 | 5 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | | 1 | | |
| 250 | 73 | 68 | 28 | 25 | 17 | 10 | 6 | 9 | 3 | 2 | 2 | 3 | | 6 | | 1 |
| 300 | 104 | 107 | 53 | 53 | 21 | 20 | 10 | 14 | 5 | 5 | 5 | 7 | 5 | 8 | 1 | 1 |
| 350 | 74 | 103 | 63 | 51 | 43 | 38 | 32 | 16 | 11 | 17 | 10 | 10 | 12 | 9 | 10 | 5 |
| 400 | 65 | 93 | 110 | 55 | 43 | 38 | 29 | 27 | 12 | 11 | 16 | 14 | 9 | 16 | 6 | 7 |
| 450 | 47 | 53 | 57 | 58 | 62 | 39 | 45 | 20 | 24 | 21 | 27 | 21 | 26 | 27 | 15 | 22 |
| 500 | 24 | 23 | 43 | 25 | 35 | 42 | 33 | 14 | 23 | 11 | 15 | 12 | 12 | 16 | 16 | 9 |
| 550 | 7 | 9 | 22 | 10 | 28 | 14 | 9 | 24 | 11 | 2 | 8 | 15 | 11 | 28 | 5 | 13 |
| 600 | 4 | 14 | 19 | 23 | 19 | 18 | 41 | 30 | 26 | 22 | 29 | 32 | 28 | 50 | 31 | 21 |
| 650 | 7 | 7 | 14 | 9 | 24 | 13 | 12 | 12 | 11 | 3 | 14 | 8 | 7 | 15 | 8 | 11 |
| 700 | | 7 | 6 | 9 | 6 | 7 | 5 | 2 | 6 | 3 | 4 | 11 | 8 | 14 | 7 | 6 |
| 750 | 1 | 4 | 3 | | 4 | 6 | 6 | 7 | 3 | 5 | 4 | 5 | 8 | 8 | 7 | 6 |
| 800 | 1 | 1 | 1 | 4 | 5 | 5 | 7 | 8 | 7 | 7 | 12 | 15 | 8 | 11 | 15 | 20 |
| 900 | | | 1 | | 2 | 1 | 3 | | 1 | | 4 | 3 | 1 | 4 | 11 | 11 |
| 1000 | | | | | | | | | | | 1 | 1 | 3 | | 6 | 7 |
| Total | 482 | 539 | 456 | 342 | 325 | 262 | 245 | 186 | 147 | 110 | 153 | 159 | 138 | 213 | 140 | 140 |
| Median | $345 | 372 | 422 | 420 | 468 | 468 | 493 | 514 | 532 | 495 | 548 | 568 | 564 | 592 | 624 | 629 |

" The median salary of men with no experience is $328, with one year of experience $370, with two years $430, with ten years $692, etc. The median salary of women with no experience is $345, with one year of experience $372, with two years $422, with ten years $548, etc.

" The tables show that the income of a group with a given experience, varies greatly. The ratio with which this income increases also varies greatly with individuals, some reaching their maximum in three years while others take twenty. In the main, however, all salary advances due merely to experience take place comparatively early in the teacher's career."

Dr. Coffman measured also the relation of salary to length of

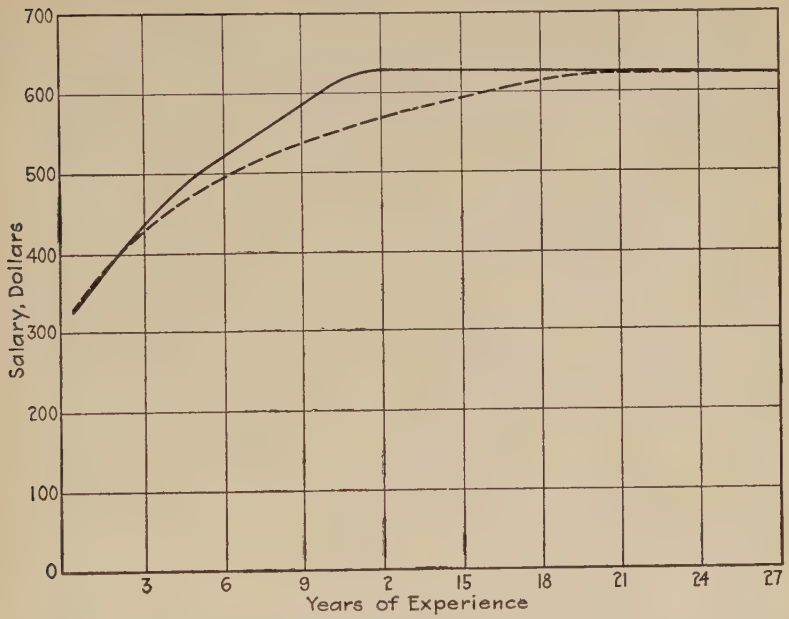



FIG. 11. The relation of length of experience to salary, using the median salaries to determine the graph. The solid line is for men teachers; the broken, for women teachers. The horizontal line is the scale in length of experience in years. The vertical scale represents the amount of salary.

education. I quote only the median salaries for the different amounts of education beyond the elementary school. These were, for men and women separately:

MEDIAN SALARIES IN DOLLARS PER YEAR

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 or more |
|---|---|---|---|---|---|---|---|---|---|---|
| Men | 455 | 411 | 421 | 438 | 457 | 534 | 658 | 800 | 975 | 1083 |
| Women | 405 | 376 | 426 | 449 | 424 | 471 | 510 | 561 | 638 | 650 |

The essential facts can be seen most easily in graphic form, as in Figure 12. Of these facts Dr. Coffman says:

"There is no uniform tendency or relation existing between salary and education. 'Education' in this report means training

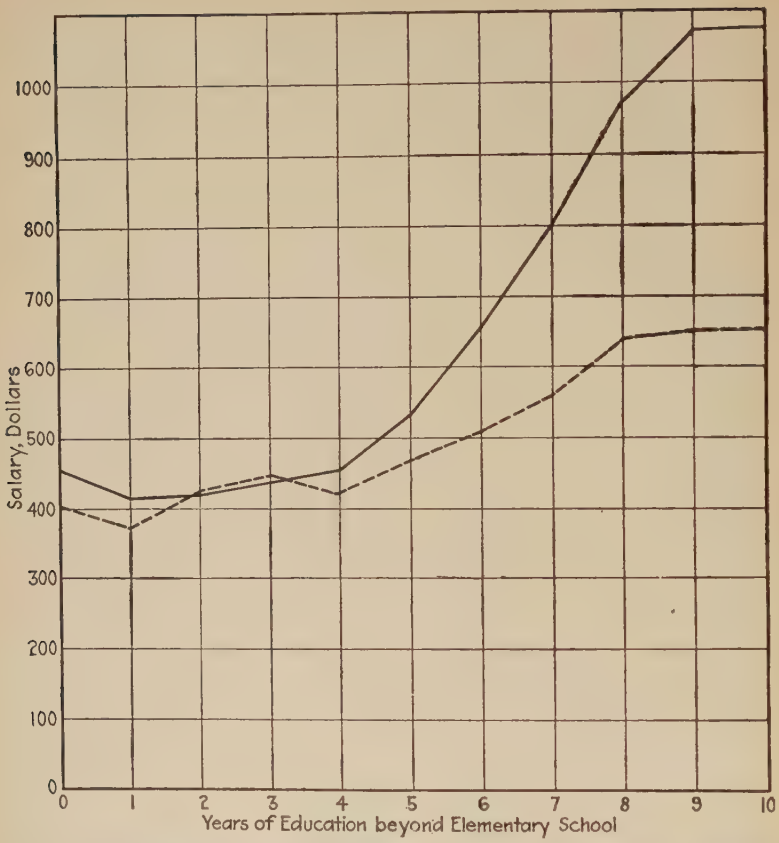



FIG. 12.—The relation of salary to amount of education, using the median salaries to determine the graph. The solid line is for men teachers; the broken line is for women teachers.

beyond the elementary school; it covers high school, normal school, and university work. One year therefore is not of equal value with another year. Those with four years of training are in most cases high school graduates, those with six years normal school graduates, those with eight years college graduates. . . .

"Two extremely important facts are revealed by this relation-

ship: (1) The first four years of training beyond the elementary schools have little or no effect upon salary; (2) correlation between salary and education becomes increasingly marked with each succeeding year after the fourth year. A premium is thus placed upon advanced academic and professional training. No doubt such training selects those who have the inborn capacity to profit by it most, but this extra training is their one best means of advertising to the world their peculiar native strength.

"As the standard number of years of training teachers have had is four, and as they receive a median salary of $457, public school authorities pay the average male teacher with 5 years of training $77 more; with 6 years of training $201 more; with 7 years of training $343 more; with 8, $526 more; and with 9 or more years, $626 more.

"The average female public school teacher with 5 years of training receives $47 more than the standard; with 6 years, $86 more; with 7 years, $137 more; with 8 years, $214 more; and with 9 or more years, $231 more."

## § 10. The Social and Economic Status of Teachers

Who are the teachers of our children? The answer to this question will throw much light upon the attempt to evaluate the education which we are offering to our citizens of to-morrow. We are in the habit of saying that teachers should have more salary. What kind of teachers do we get for the money we pay? Is there any relation between the amount of salary a teacher receives and the amount of training secured by him? From what social group do teachers come? These and many other similar questions must be answered by any one who would attempt to judge of the efficiency of our public systems of education. In the investigation by Professor L. D. Coffman entitled "The Social Composition of the Teaching Population," we have the answer to our questions.

Dr. Coffman's research is based upon the answers received to a questionnaire which was answered by 5,215 teachers selected at random in seventeen states. Most of the answers were secured from teachers who were in attendance upon their annual institutes. The purpose of the questionnaire was explained and replies were received from *all* of those present. Only a few of Dr. Coffman's tables of results can be presented here. The order in which they are given is chosen by the writer. The tables are in the main self-explanatory.

When we ask, Who are the teachers of our children, we must inquire concerning the families from which teachers come. The social status and the income of the parents of teachers limits the social inheritance which these teachers transmit to children. The following tables giving the occupations of parents, their income, and the number of brothers and sisters present a clear

picture of the social and economic groups represented by the families from which teachers are recruited.

TABLE 23

RACE AND NATIVITY OF WOMEN TEACHERS

| RACE AND NATIVITY | WOMEN 16 YEARS OF AGE AND OVER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | AGGREGATE | | | IN CITIES HAVING AT LEAST 50,000 INHAB. | | | IN SMALLER CITIES AND COUNTRY DISTRICTS | | |
| | Total | Teachers | | Total | Teachers | | Total | Teachers | |
| | | No. | Per 10,000 | | No. | Per 10,000 | | No. | Per 1,000 |
| Native white, both parents native | 12,130,161 | 207,823 | 171 | 1,703,955 | 35,514 | 208 | 10,426,206 | 72,309 | 165 |
| Native white, one or both parents foreign born | 4,288,969 | 88,449 | 206 | 1,700,209 | 30,670 | 180 | 2,588,760 | 57,779 | 223 |
| Foreign born, white | 4,403,494 | 17,218 | 39 | 2,095,206 | 7,553 | 36 | 2,308,288 | 9,665 | 42 |

TABLE 24

DISTRIBUTION OF MEN TEACHERS ACCORDING TO THE OCCUPATION OF THEIR FATHERS

| | Ida. | Ill. | Ind. | Ga. | Ia. | Kan. | Md. | Minn. | Mo. | Mont. | N. H. | N. J. | N. Y. | Pa. | Tenn. | Tex. | Wis. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Not answered | 4 | 5 | 20 | | | | 2 | | 2 | | | 4 | 2 | 8 | 3 | 1 | 1 | 52 |
| Farmers | 29 | 47 | 245 | 6 | | 21 | 27 | 4 | 81 | 3 | 2 | 33 | 75 | 71 | 14 | 9 | 20 | 687 |
| Prof. men | 2 | 4 | 13 | 6 | | | 7 | 1 | 4 | 1 | | 7 | 8 | 8 | 2 | 5 | 1 | 69 |
| Business | 3 | 5 | 11 | 3 | | 3 | 6 | 2 | 5 | | | 10 | 9 | 5 | 1 | | 1 | 61 |
| Artisans | | 4 | 20 | 2 | | 1 | 5 | 2 | 1 | 1 | 1 | 7 | 6 | 24 | | | 3 | 79 |
| Laborers | 2 | 4 | 16 | | 1 | | 2 | | 4 | | 1 | 9 | 9 | 19 | | | 1 | 69 |
| Pub. officials | | 3 | 1 | | | | | 1 | 1 | | | 2 | | | | | | 8 |
| Retired | | | 5 | 1 | | 2 | | | | | | | 1 | 3 | | | | 12 |
| Totals | 40 | 72 | 331 | 18 | 1 | 27 | 49 | 10 | 98 | 5 | 4 | 72 | 110 | 138 | 20 | 15 | 27 | 1037 |

TABLE 25

DISTRIBUTION OF WOMEN TEACHERS ACCORDING TO THE OCCUPATION OF THEIR FATHERS

| | Ida. | Ill. | Ind. | Ga. | Ia. | Kan. | Md. | Minn. | Mo. | Mont. | N. H. | N. J. | N. Y. | Pa. | Tenn. | Tex. | Wis. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Not answered | 3 | 17 | 44 | 6 | 3 | 4 | 26 | 2 | 12 | 5 | 2 | 31 | 29 | 18 | 3 | 3 | 6 | 214 |
| Farmers | 47 | 127 | 198 | 8 | 33 | 55 | 128 | 36 | 145 | 10 | 19 | 103 | 335 | 73 | 22 | 24 | 46 | 1,409 |
| Prof. men | 8 | 12 | 42 | 10 | 6 | 6 | 23 | 6 | 19 | 6 | | 41 | 26 | 12 | 13 | 6 | 2 | 238 |
| Business | 14 | 26 | 82 | 13 | 4 | 11 | 58 | 11 | 40 | 2 | 10 | 106 | 47 | 36 | 23 | 4 | 4 | 493 |
| Artisans | 13 | 22 | 83 | 12 | 5 | 9 | 62 | 16 | 16 | 3 | 19 | 106 | 96 | 33 | 11 | 5 | 8 | 519 |
| Laborers | 7 | 30 | 35 | 2 | 22 | 6 | 34 | 10 | 23 | 2 | 4 | 61 | 76 | 37 | 6 | 2 | 4 | 361 |
| Pub. officials | 1 | 3 | 10 | | | 2 | 9 | 1 | 4 | 1 | | 6 | 11 | 4 | 4 | | 2 | 58 |
| Retired | 2 | 7 | 11 | 7 | 1 | | 3 | 3 | 4 | | | 12 | 14 | 4 | 1 | | | 69 |
| Invalids | 1 | 1 | 1 | | 1 | | 1 | | | 1 | | | | | | | | 6 |
| Totals | 96 | 245 | 506 | 58 | 75 | 93 | 344 | 85 | 263 | 30 | 54 | 466 | 636 | 217 | 83 | 44 | 72 | 3,367 |

TABLE 26

SUMMARY OF TABLES 24 AND 25 IN PERCENTAGES

| | Men | Women |
|---|---|---|
| Percentage who are the children of farmers | 69.7 | 44.8 |
| Percentage who are the children of men in professional life | 7.0 | 7.5 |
| Percentage who are the children of business men | 6.2 | 15.3 |
| Percentage who are the children of artisans | 8.0 | 16.4 |
| Percentage who are the children of laborers | 7.0 | 11.3 |
| Percentage who are the children of public officials | .8 | 1.8 |

TABLE 27

THE RELATION OF THE OCCUPATION OF PARENTS OF TEACHERS TO PARENTAL INCOME

| Income | Farmers | | | Professions | | | Business | | | Artisans | | | Laborer | | | Officials | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M. | W. | Tot. | M. | W. | Tot. | M. | W. | Tot. | M. | W. | Tot. | M. | W. | Tot. | M. | W. | Tot. |
| —$250 | 88 | 122 | 210 | 1 | 10 | 11 | 1 | 13 | 14 | 6 | 13 | 19 | 11 | 35 | 46 | | 2 | 2 |
| $250— 500 | 167 | 218 | 385 | 11 | 19 | 30 | 7 | 25 | 32 | 17 | 46 | 63 | 26 | 86 | 112 | 1 | 4 | 5 |
| 500— 750 | 118 | 182 | 300 | 9 | 29 | 38 | 7 | 25 | 32 | 18 | 75 | 93 | 15 | 109 | 124 | 2 | 5 | 7 |
| 750—1000 | 95 | 194 | 289 | 14 | 34 | 48 | 10 | 68 | 78 | 19 | 113 | 132 | 8 | 46 | 54 | 1 | 11 | 12 |
| 1000—1250 | 62 | 150 | 212 | 8 | 29 | 37 | 8 | 69 | 77 | 7 | 92 | 99 | 3 | 9 | 12 | 1 | 12 | 13 |
| 1250—1500 | 22 | 47 | 69 | 3 | 17 | 30 | 5 | 37 | 42 | 4 | 24 | 28 | | 2 | 2 | 1 | 4 | 5 |
| 1500—1750 | 14 | 35 | 49 | 3 | 6 | 9 | 2 | 15 | 17 | 4 | 15 | 19 | 1 | 4 | 5 | 1 | 1 | 2 |
| 1750—2000 | 28 | 59 | 87 | 4 | 16 | 20 | 3 | 36 | 39 | 1 | 19 | 20 | 1 | | 1 | | 3 | 3 |
| 2000+ | 37 | 104 | 1141 | 5 | 33 | 38 | 15 | 101 | 116 | 3 | 28 | 31 | | 3 | 3 | 1 | 8 | 9 |
| | | | 1742 | | | 261 | | | 447 | | | 504 | | | 359 | | | 58 |
| Median | | | $730 | | | $1025 | | | $1219 | | | $896 | | | $542 | | | $1058 |
| Quartile | | | 315 | | | 447 | | | 575 | | | 287 | | | 189 | | | 365 |

TABLE 28

THE RELATION OF NUMBER OF BROTHERS AND SISTERS OF TEACHERS TO THE OCCUPATION OF FATHERS

| | Farmers | | | Professional | | | Business | | | Artisans | | | Laborers | | | Officials | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M. | W. | Tot. | M. | W. | Tot. | M. | W. | Tot. | M. | W. | Tot. | M. | W. | Tot. | M. | W. | Tot. |
| 0 | 32 | 77 | 109 | 4 | 10 | 14 | 2 | 31 | 33 | 8 | 45 | 53 | 5 | 19 | 24 | | 1 | 1 |
| 1 | 75 | 151 | 226 | 11 | 37 | 48 | 4 | 77 | 81 | 11 | 74 | 85 | 6 | 52 | 58 | 1 | 7 | 8 |
| 2 | 74 | 175 | 249 | 8 | 44 | 52 | 6 | 80 | 86 | 16 | 90 | 106 | 13 | 62 | 75 | 1 | 16 | 7 |
| 3 | 78 | 226 | 304 | 11 | 38 | 49 | 8 | 86 | 92 | 7 | 99 | 106 | 7 | 61 | 68 | 1 | 4 | 5 |
| 4 | 72 | 184 | 256 | 9 | 42 | 51 | 11 | 67 | 78 | 8 | 65 | 73 | 7 | 54 | 61 | 2 | 12 | 14 |
| 5 | 79 | 175 | 254 | 8 | 13 | 21 | 7 | 58 | 65 | 12 | 53 | 65 | 6 | 30 | 36 | 1 | 5 | 6 |
| 6 | 64 | 142 | 206 | 2 | 20 | 22 | 7 | 41 | 48 | 1 | 41 | 42 | 7 | 27 | 34 | 1 | 4 | 5 |
| 7 | 57 | 110 | 167 | 2 | 14 | 16 | 4 | 25 | 29 | 6 | 16 | 22 | 2 | 16 | 18 | 1 | 3 | 4 |
| 8 | 44 | 73 | 117 | 3 | 9 | 12 | | 11 | 11 | 4 | 16 | 20 | 3 | 16 | 19 | | 3 | 3 |
| 9 | 25 | 51 | 76 | 3 | 10 | 13 | 5 | 10 | 15 | 3 | 12 | 15 | 2 | 3 | 5 | | 2 | 2 |
| 10 | 13 | 23 | 36 | 4 | | 4 | 3 | 3 | 6 | 2 | 5 | 7 | 2 | 3 | 5 | | | |
| 11 | 12 | 9 | 21 | 1 | | 1 | | 2 | 2 | 1 | 4 | 5 | | 5 | 5 | | | |
| 12 | 6 | 7 | 13 | 1 | | 1 | | 1 | 1 | 1 | 1 | 2 | | 2 | 2 | | 1 | 1 |
| 13 | 2 | | 2 | | 1 | 1 | | | | | | | | 1 | 1 | | | |
| 14 | 3 | 2 | 5 | | | | | | | | | | | | | | | |
| 15 | | | | | 1 | 1 | | | | | | | | | | | | |
| 16 | 1 | | 1 | | | | | | | | | | | | | | | |
| 17 | 1 | 1 | 2 | | | | | | | | | | | | | | | |
| | | | 2044 | | | 306 | | | 549 | | | 601 | | | 409 | | | 64 |
| Median | | | 4 | | | 3 | | | 3 | | | 3 | | | 3 | | | 4 |
| 25 P | | | 2 | | | 2 | | | 2 | | | 2 | | | 2 | | | 2 |
| 75 P | | | 6 | | | 2 | | | 6 | | | 6 | | | 5 | | | 5 |

The relation between parental income and years of training beyond the elementary school secured before beginning to teach and between parental income and the age at which teaching was begun appear in the following tables. The income of parents indicated in the table by 0, 1, 2, 3, etc., are (0) less than $250; (1) $250–$500; (2) $500–$750; (3) $750–$1,000; . . . . . (9) $2,250–$2,500.

TABLE 29

THE RELATION OF PARENTAL INCOME TO YEARS OF TRAINING OF MEN TEACHERS

| Training | Parental Income | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 25 | 12 | 33 | 18 | 9 | 10 | 3 | 3 | 3 | 6 |
| 1 | 5 | 31 | 37 | 14 | 13 | 6 | 2 | | 4 | 6 |
| 2 | 9 | 28 | 44 | 21 | 16 | 12 | 3 | 1 | 4 | 9 |
| 3 | 12 | 18 | 33 | 25 | 25 | 13 | 3 | 3 | 4 | 6 |
| 4 | 20 | 29 | 51 | 47 | 33 | 21 | 9 | 2 | 8 | 8 |
| 5 | 5 | 7 | 36 | 22 | 25 | 10 | 3 | 6 | 4 | 6 |
| 6 | 8 | 9 | 17 | 22 | 19 | 9 | 4 | 4 | 6 | 3 |
| 7 | 4 | 6 | 7 | 14 | 13 | 9 | 6 | 2 | 3 | 5 |
| 8 | 10 | 7 | 13 | 12 | 16 | 9 | 3 | 3 | 6 | 6 |
| 9 | 2 | 1 | 3 | 3 | 2 | 4 | | | | 3 |
| 10 | 1 | | 5 | 2 | 4 | 5 | 3 | | 1 | 3 |
| Totals | 101 | 148 | 279 | 200 | 175 | 108 | 39 | 24 | 43 | 61 |
| Median | 3 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 4 |

TABLE 30

THE RELATION OF PARENTAL INCOME TO YEARS OF TRAINING OF WOMEN TEACHERS

| Training | Parental Income | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 65 | 40 | 51 | 35 | 15 | 10 | 2 | 6 | 5 | 15 |
| 1 | 51 | 33 | 50 | 39 | 35 | 10 | 6 | 6 | 7 | 17 |
| 2 | 77 | 40 | 50 | 50 | 44 | 32 | 17 | 8 | 16 | 21 |
| 3 | 129 | 60 | 80 | 77 | 91 | 58 | 17 | 15 | 22 | 28 |
| 4 | 241 | 89 | 128 | 146 | 154 | 134 | 40 | 26 | 39 | 71 |
| 5 | 150 | 44 | 68 | 78 | 93 | 73 | 23 | 14 | 31 | 45 |
| 6 | 125 | 44 | 66 | 56 | 83 | 55 | 21 | 8 | 22 | 69 |
| 7 | 48 | 9 | 13 | 18 | 17 | 24 | 10 | 3 | 4 | 16 |
| 8 | 39 | 7 | 14 | 11 | 14 | 16 | 8 | 3 | 11 | 36 |
| 9 | 12 | 1 | 3 | 1 | 5 | 2 | 3 | | 3 | 7 |
| 10 | 1 | 3 | 7 | 1 | 3 | 3 | 3 | | | 3 |
| Totals | 938 | 370 | 529 | 512 | 554 | 417 | 140 | 89 | 160 | 328 |
| Median | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 5 |

TABLE 31

RELATION OF PARENTAL INCOME TO BEGINNING AGE OF MEN TEACHERS

| Beginning Age | Parental Income | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 16 | 7 | 9 | 2 | 5 | 4 | 1 | 1 | | 3 |
| 17 | 8 | 25 | 18 | 12 | 6 | 2 | 2 | 5 | 9 |
| 18 | 16 | 65 | 44 | 47 | 21 | 12 | 3 | 10 | 10 |
| 19 | 32 | 56 | 27 | 31 | 24 | 4 | 4 | 8 | 14 |
| 20 | 35 | 45 | 38 | 25 | 18 | 3 | 7 | 8 | 7 |
| 21 | 25 | 31 | 36 | 19 | 12 | 6 | 3 | 5 | 5 |
| 22 | 10 | 19 | 14 | 14 | 6 | 4 | | 2 | 3 |
| 23 | 5 | 9 | 9 | 10 | 7 | 3 | 1 | | 2 |
| 24 | 2 | 9 | 5 | 5 | 4 | | 1 | 2 | 3 |
| 25 | 4 | 4 | 2 | 4 | 2 | 3 | 1 | | 1 |
| 26 | | 1 | 2 | 1 | 3 | | | 3 | |
| 27 | 2 | | 1 | | | | | | |
| 28 | 1 | 1 | 1 | | | | 1 | | 1 |
| 29 | | | | 1 | | 1 | | | 1 |
| 30 | | 3 | | | 1 | | | | 2 |
| Totals | 147 | 277 | 199 | 174 | 108 | 39 | 24 | 43 | 61 |
| Median age | 20.3 | 19.7 | 20.2 | 19.7 | 19.7 | 20.0 | 20.3 | 19.7 | 19.6 |

TABLE 32

RELATION OF PARENTAL INCOME TO BEGINNING AGE OF WOMEN TEACHERS

| Beginning Age | Parental Income | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 16 | 17 | 25 | 18 | 10 | 16 | 3 | | 3 | 13 |
| 17 | 57 | 66 | 50 | 53 | 48 | 9 | 10 | 16 | 15 |
| 18 | 107 | 139 | 163 | 176 | 100 | 29 | 20 | 39 | 76 |
| 19 | 62 | 95 | 98 | 137 | 105 | 33 | 29 | 36 | 62 |
| 20 | 54 | 105 | 88 | 87 | 62 | 20 | 16 | 21 | 47 |
| 21 | 39 | 49 | 40 | 38 | 35 | 20 | 6 | 15 | 61 |
| 22 | 19 | 25 | 22 | 24 | 17 | 9 | 2 | 10 | 18 |
| 23 | 6 | 8 | 13 | 9 | 12 | 5 | 3 | 6 | 15 |
| 24 | 2 | 7 | 4 | 9 | 4 | 4 | | 3 | 8 |
| 25 | 3 | 2 | 4 | 1 | 2 | 3 | 1 | 4 | 3 |
| 26 | 2 | 1 | 3 | 3 | 2 | | | 2 | 1 |
| 27 | 3 | 3 | 1 | 1 | 2 | | | 1 | 1 |
| 28 | | | 1 | | 1 | 1 | | | 2 |
| 29 | | 2 | | | 3 | | | 1 | |
| 30 | 6 | 1 | 1 | | 4 | | | 2 | 1 |
| Totals | 377 | 528 | 506 | 548 | 413 | 136 | 87 | 159 | 323 |
| Median age | 19.1 | 19.3 | 19.3 | 19.2 | 19.4 | 19.8 | 19.5 | 19.6 | 20.0 |

Dr. Coffman's conclusions, amply justified by the data studied, are given below. Attention is called in particular to the questions with which this summary closes.

## "The Typical American Teacher"

"The typical American male public school teacher, assuming that he can be described in terms of the medians previously referred to, but remembering that a median is a point about which individuals vary and that our hypothetical individual is as likely to be below as above it, is twenty-nine years of age, having begun teaching when he was almost twenty years of age after he had received but three or four years of training beyond the elementary school. In the nine years elapsing between the age he began teaching and his present age, he has had seven years of experience and his salary at the present time is $489 a year. Both of his parents were living when he entered teaching and both spoke the English language. They had an annual income from their farm of $700 which they were compelled to use to support themselves and their four or five children.

"His first experience as a teacher was secured in the rural schools, where he remained for two years at a salary of $390 per year. He found it customary for rural school teachers to have only three years of training beyond the elementary school, but in order for him to advance to a town school position he had to get an additional year of training. He also found that in case he wished to become a city school teacher that two more years of training or six in all beyond the elementary school were needed.

"His salary increased rather regularly during the first six years of his experience, or until he was about twenty-six years of age After that he found that age and experience played a rather insignificant part in determining his salary, but that training still afforded him a powerful leverage.

"The typical American female teacher is twenty-four years of age, having entered teaching in the early part of her nineteenth year when she had received but four years training beyond the elementary schools. Her salary at her present age is $485 a year.

She is native born of native born parents, both of whom speak the English language. When she entered teaching both of her parents were living and had an annual income of approximately $800 which they were compelled to use to support themselves and their four or five children. The young woman early found the pressure both real and anticipated to earn her own way very heavy. As teaching was regarded as a highly respectable calling and as the transfer from school room as a student to it as a teacher was but a step, she decided upon teaching.

"Her first experience as a teacher was gotten in the rural school where she remained but two years. If she went from there to a town school her promotion was based almost solely upon her experience as no additional training was required by the officials of the town. If she desired to teach in a city school, she was compelled to secure at least one more year of training in all, but each additional year of training she found increased her salary.

"So far she has profited each year of her brief experience by having her salary increased and this will probably be true for the next two years should she find it necessary to remain in teaching that long.

"Into the hands of teachers who more or less nearly conform to the above description is given the duty of transmitting the culture of the race to the youth of the land, of training them in habits of thinking, in modes of behavior, in methods of work, and in intelligent appreciations. Some of the unanswered questions are: What initiative and resourcefulness have such teachers? What perspective due to thorough preparation have they secured? What vision of the possibilities of the calling do they possess? What modicum do they add to our professional inheritance? What chance has the average American boy or girl of being wisely and intelligently educated by the average American teacher, male or female?"

## § 11. The Supervision of Special Subjects

The practice of supervision varies widely in the United States. In most cities supervisors may be roughly classified into two groups; general supervisors who have oversight of all of the subjects taught in a school, a group of schools or one or more grades in a group of schools, and special supervisors who direct the work in a single subject in all of the grades of a group of schools. The first group of supervisors are variously named, superintendents, assistant and district superintendents, grammar grade and primary supervisors, and principals. In the second group are special supervisors of music, drawing, penmanship, manual training, physical education, sewing, domestic science. The general supervisors are the highest paid men and women in our school systems. They are expected to have general control of schools with respect to organization, curriculum, discipline, methods of instruction and the like. With the increase is administrative responsibility, found in the office of superintendent or of principal of a large school, these officers tend to pay more attention to organization and less to the efficiency of the teaching done in the schools under their direction. Their work is often supplemented by the primary or grammar grade supervisor who devotes almost all of his time to the professional growth of teachers, the proper organization of the course of study and the like.

With the introduction of new subjects with which the general supervisor is not familiar or which he feels unable to supervise adequately there is a demand for a special supervisor. These special supervisors vary in our cities from men and women who are merely special teachers, to those who are in fact supervisors who direct the work of many special teachers or who train the regular

grade teacher to teach the special subject. The frequency with which these special supervisors or teachers are employed in cities having more than 8,000 inhabitants, the sex selection, the responsibility which these supervisors assume and the salaries paid to them are among the topics most carefully treated in Professor W. A. Jessup's "Social Factors Affecting Special Supervision." Some of the tables from Dr. Jessup's study are given below.

TABLE 33

PERCENTAGES OF CITIES REPORTING THE EMPLOYMENT OF SUPERVISORS OF SPECIAL SUBJECTS IN 1908

| | |
|---|---|
| Music | 85.42 |
| Drawing | 75.81 |
| Penmanship | 21.39 |
| Manual Training | 43.40 |
| Sewing | 18.60 |
| Domestic Science | 30.07 |
| Physical Education | 20.15 |

"In recent years there has been a striking increase in the number of cities employing specialists. This has been especially true of music, drawing and manual training. Distribution for the location of the cities brings out the fact that the early development of the practice of employing specialists has been largely confined to the states of the North Atlantic and the North Central divisions. Distribution for size of cities indicates that the practice has for the most part started in the larger cities, extending to the smaller cities later."

TABLE 34

THE DISTRIBUTION, BY SEX, OF SUPERVISORS OF SPECIAL SUBJECTS (1908)

(a) Distribution of men and women, by subjects and location.
(b) Percentage of women specialists, distributed by subjects and location.

| | *North Atlantic States* | | | *South Atlantic States* | | | *South Central States* | | | *North Central States* | | | *Western States* | | | *United States as a whole* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | Fem. | Tot. | Male | Fem. | Tot. | Male | Fem. | Tot. | Male | Fem. | Tot. | Male | Fem. | Tot. | Male | Fem. | Tot. |
| (a) | | | | | | | | | | | | | | | | | | |
| Music | 105 | 113 | 218 | 4 | 17 | 21 | 7 | 23 | 30 | 55 | 131 | 186 | 9 | 28 | 37 | 180 | 312 | 492 |
| Drawing | 37 | 149 | 186 | 4 | 13 | 17 | 2 | 27 | 29 | 15 | 136 | 151 | 5 | 32 | 37 | 63 | 357 | 420 |
| Penmanship | 35 | 18 | 53 | 3 | | 3 | 7 | 4 | 11 | 22 | 18 | 40 | 6 | 6 | 12 | 73 | 46 | 119 |
| Manual Training | 65 | 28 | 93 | 15 | 4 | 19 | 16 | 2 | 18 | 91 | 17 | 108 | 23 | 2 | 25 | 210 | 53 | 263 |
| Sewing | | 41 | 41 | | 5 | 5 | | 5 | 5 | | 11 | 11 | | 5 | 5 | | 67 | 67 |
| Domestic Sci. | | 50 | 50 | | 19 | 19 | | 14 | 14 | | 69 | 69 | | 19 | 19 | | 171 | 171 |
| Physical Edu. | 15 | 34 | 49 | 2 | 5 | 7 | 3 | | 3 | 26 | 18 | 44 | 7 | 5 | 12 | 53 | 62 | 115 |
| (b) | | | | | | | | | | | | | | | | | | |
| Music | | 51.83 | | | 80.95 | | | 76.66 | | | 70.43 | | | 75.67 | | | 63.41 | |
| Drawing | | 80.10 | | | 76.47 | | | 93.10 | | | 90.06 | | | 86.48 | | | 85.00 | |
| Penmanship | | 33.94 | | | 10.00 | | | 36.33 | | | 45.00 | | | 50.00 | | | 38.65 | |
| Manual Training | | 30.10 | | | 21.05 | | | 11.11 | | | 15.74 | | | 8.00 | | | 20.14 | |
| Sewing | | 100.00 | | | 100.00 | | | 100.00 | | | 100.00 | | | 100.00 | | | 100.00 | |
| Domestic Sci. | | 100.00 | | | 100.00 | | | 100.00 | | | 100.00 | | | 100.00 | | | 100.00 | |
| Physical Edu. | | 69.38 | | | 71.42 | | | 0.00 | | | 40.90 | | | 41.66 | | | 54.78 | |

"A return postal card was submitted to a group of specialists in each subject selected at random.

Subject supervised..... Annual Salary..... Sex.....
Check (X) the method which most nearly describes yours.
( ) a. Special subject taught entirely by regular teacher.
( ) b. New material taught by yourself or assistants at regular intervals, followed by a drill on the same by the regular teacher.
( ) c. Special subject entirely under your charge and all lessons given by yourself or assistants.

"Three hundred and forty-three replies were received from the nine hundred and ninety-eight cards sent out. Of this number twenty-five were discarded on account of indefinite response. There remained three hundred and eighteen replies that were clearly answered. These were distributed as follows: eighty-three represented specialists in music; eighty-six in drawing; eighteen in penmanship; twenty-four in physical education; fifty-eight in manual training; thirty-three in domestic science and sixteen in

sewing. It is thus seen that the returns were related somewhat closely to the number of specialists in each field.

"These answers for each subject were thus distributed for method and size of cities."

TABLE 35

DIFFERENCES IN THE DIVISION OF RESPONSIBILITY (1910)

| (1) Size of City / Plan | Music | | | Drawing | | | Penmanship | | | Physical Education | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A. | B. | C. | A. | B. | C. | A. | B. | C. | A. | B. | C. |
| 8– 10,000 | | 8 | 2 | 1 | 6 | 3 | | 1 | | | 2 | |
| 10– 15,000 | | 17 | 2 | 1 | 19 | 2 | | 4 | 1 | | 1 | |
| 15– 20,000 | 1 | 10 | 1 | | 6 | 1 | | 1 | 1 | | | |
| 20– 30,000 | 2 | 7 | | 1 | 9 | 1 | 2 | 1 | | | 1 | 1 |
| 30– 50,000 | 3 | 6 | 2 | | 14 | | | 3 | | | 2 | |
| 50–100,000 | 2 | 9 | | 2 | 6 | 1 | | 1 | | | 3 | |
| 100–200,000 | 2 | 2 | | 1 | 1 | | | 1 | | | 3 | 1 |
| 200–1,000,000 | 4 | 1 | 1 | 2 | 5 | 2 | | 2 | | 2 | 8 | |
| 1,000,000 and over | | 1 | | | 2 | | | | | | | |

| Size of City / Plan | Manual Training | | | Domestic Science | | | Sewing | | |
|---|---|---|---|---|---|---|---|---|---|
| | A. | B. | C. | A. | B | C.. | A. | B. | C. |
| 8– 10,000 | 1 | | 8 | | | 4 | | | 1 |
| 10– 15,000 | | | 6 | | | 4 | | | |
| 15– 20,000 | | | 3 | | | 2 | | 1 | 1 |
| 20– 30,000 | 1 | 1 | 4 | | | 3 | | | 3 |
| 30, 50,000 | 1 | 3 | 3 | | 4 | 4 | | | |
| 50–100,000 | | 2 | 12 | | | 4 | | 2 | 4 |
| 100–200,000 | | 1 | 4 | | 1 | 2 | 1 | | 1 |
| 200–1,000,000 | 1 | | 5 | | | 4 | 1 | 3 | |
| 1,000,000 and over | | 1 | 1 | | | 1 | | | |

(2) Combining Irrespective of Size of Cities

| Plan | A. | B. | C. | Total |
|---|---|---|---|---|
| Music | 14 | 61 | 8 | 83 |
| Drawing | 8 | 68 | 10 | 86 |
| Penmanship | 2 | 14 | 2 | 18 |
| Physical Education | 2 | 20 | 2 | 24 |
| Manual Training | 4 | 8 | 46 | 58 |
| Domestic Science | 0 | 5 | 28 | 33 |
| Sewing | 2 | 4 | 10 | 16 |

(3) Percentage of Cities Following Plan C

| | Per cent |
|---|---|
| Music | 9.6 |
| Drawing | 11.6 |
| Penmanship | 11.11 |
| Physical Education | 8.3 |
| Manual Training | 79.3 |
| Domestic Science | 84.8 |
| Sewing | 62.5 |

TABLE 36

MEDIAN ANNUAL SALARIES OF SUPERVISORS OF SPECIAL SUBJECTS (1908,

| SUBJECT | MEN | WOMEN | MIDDLE 50 PER CENT | |
|---|---|---|---|---|
| | | | MEN | WOMEN |
| Music | $1,009.37 | $748.38 | $800–$1,300 | $600–$ 900 |
| Drawing | 1,116.66 | 807.50 | 950– 1,750 | 650– 950 |
| Penmanship | 1,104.16 | 766.66 | 800– 1,300 | 600– 950 |
| Manual Training | 1,138.63 | 795.83 | 900– 1,500 | 650– 1,000 |
| Physical Education | 1,141.66 | 803.33 | 900– 1,500 | 600– 1,000 |
| Domestic Science | | 804.16 | | 600– 950 |
| Sewing | | 742.80 | | 600– 900 |

The tables given above which show salaries and responsibility assumed suggest certain questions concerning the current practice. It will be noted that one-fourth of the women supervisors get less than six hundred and fifty dollars. When this fact is related to the plan of work most commonly followed by these supervisors, one may question the wisdom of this kind of school organization. What can one expect from a six hundred dollar teacher who visits the classroom occasionally and teaches a lesson in music, drawing, or physical culture which is usually not vitally related to anything else which the children do. Fifty-six per cent of the supervisors follow this plan of work. Even the higher paid teacher who spends her time going from room to room teaching children with whom she is unacquainted, with very little time for conference with the room teacher, often with very little ability to train the regular teacher, may not be an entirely good investment. It has seemed to the writer that any subject taught in the regular classroom should be taught by the regular teaching staff. Out of a group of ten or of fifty teachers in any one building it ought to be possible to find teachers who could undertake work in music, drawing, penmanship, sewing and the simpler forms of manual training. There would be a distinct advantage in having one regular teacher teaching the music in three or four rooms

while other teachers with special ability undertook the work in drawing, penmanship or manual training. Such an interchange of work ought to make for strength all along the line. The special subjects would be taught by teachers acquainted with the children and with the whole curriculum. If such a plan of organization were followed, it would be the special function of a well paid *supervisor* to work with teachers of special talent and with more than usual interest in the field represented.

## § 12. The Teaching Staff of Secondary Schools in the United States [1]

### *The Nature of the Data and the Sources of Error*

The data obtained from secondary schools concerning the status of their teachers came in response to the blank reprinted below. The data were not furnished at all in the case of some few public schools and many private schools. They were incomplete in still other cases, the optional list of individualized facts naturally being omitted as a general rule by the very large high schools.

There is probably a tendency on the part of those private schools which are below the standard in their locality in respect to the salaries and preparation of their staff, to withhold the data more frequently than is done by those which are above the standard. I should, in fact, consider that to estimate for private secondary schools as a whole from the selected group that do report, it would be proper to figure the non-reporting institutions as about 10 per cent lower than those reporting, in salaries and in the length of education of the staff.

There is a tendency to include in the reports teachers of the elementary grades, but this error can be detected by means of certain facts reported in the general blank. The staff of the United States Bureau of Education eliminated such cases from the records.

### *Special Inquiry Blank of the Bureau of Education*

The information under "Special," in all probability, will not

[1] This section is in the main quoted from the *Bulletin of the U. S. Bureau of Education* with the same title by Edward L. Thorndike (Bulletin No. 4, 1909).

be asked for again for at least five years. It is therefore of the utmost importance that it be given in complete form and of course with great pains to attain perfect accuracy.

SPECIAL

Give below the number of teachers (including the principal) receiving in cash the approximate annual salary indicated. In case of a private school state how many of each salary receive board and lodging in addition.

| | Less than $400 | $400 to $499 | $500 to $599 | $600 to $699 | $700 to $799 | $800 to $899 | $900 to $999 | $1000 to $1099 |
|---|---|---|---|---|---|---|---|---|
| Men | | | | | | | | |
| Women | | | | | | | | |
| Board and lodging | | | | | | | | |

| | $1100 to $1199 | $1200 to $1299 | $1300 to $1399 | $1400 to $1499 | $1500 to $1999 | $2000 to $2499 | $2500 to $2999 | $3000 or more |
|---|---|---|---|---|---|---|---|---|
| Men | | | | | | | | |
| Women | | | | | | | | |
| Board and lodging | | | | | | | | |

Give the number of teachers (including the principal) who have had regular high school, normal, college, or other higher education beyond the elementary school extending over the periods indicated.

| | Less than 1 year | 1 up to 2 years | 2 up to 4 years | 4 up to 6 years | 6 up to 8 years | 8 up to 9 years | 9 up to 10 years | 10 years or more |
|---|---|---|---|---|---|---|---|---|
| Men | | | | | | | | |
| Women | | | | | | | | |

Give the number of teachers (including the principal) who have taught (previous to the year 1906–7) the number of years indicated.

| | Less than 1 year | 1 year | 2 years | 3 years | 4 years | 5 years | 6 years | 7 years |
|---|---|---|---|---|---|---|---|---|
| Men | | | | | | | | |
| Women | | | | | | | | |

| | 8 years | 9 years | 10 to 14 years | 15 to 19 years | 20 to 24 years | 25 to 29 years | 30 to 34 years | 35 years or more |
|---|---|---|---|---|---|---|---|---|
| Men | | | | | | | | |
| Women | | | | | | | | |

ALTERNATIVE FORM

In lieu of the statistics asked for in the three special tables above, it would be more useful to the bureau to have the same information given in the form indicated in the table below. In column (A) give the name of the individual teacher; (B) sex; (C) salary per year in cash; (D) state whether or not board and lodging are included; (E) state the subjects which he, or she, teaches; (F) the number of years the teacher spent as a student in high school; (G) number of years as a student in a regular normal school, or other school of higher education beyond the high school; (H) years of teaching experience previous to this year.

The information given below will be treated as confidential with respect to the institution and individuals. In case the information requested be given in the following table, the summarized statistics asked for in the three special tables above may be omitted.

| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| Names of High School Teachers | Sex | Annual Salary | Board and Lodging | Subjects Taught by Each | Years Education in H. S. | Years Beyond H. S. | Years Experience |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

..... .....

(Signature and title of officer making this report.) (Post-office and street address.)

*Errors in the Amount of Salary Reported*

In the case of salary amounts there is the possibility, especially in the case of private schools in cities, that teachers who give only part of their time in return for the salary will be included without a note to that effect. This will, however, happen only rarely, for the institutions concerned will naturally protect themselves against any too low estimate of their salary schedule. Where some teachers receive much less than the general average for the school I have therefore been very cautious in including them. There are perhaps a very few such cases of part-time salaries included in the case of private schools in cities. On the other hand, there are counterbalancing cases of teachers in private schools who are required to give more time to the work for which the salary is paid than is the case in public high schools.

The inequality in the length of the school year for which the salary is given is not exactly a source of error, but is a factor which must be considered in interpreting the salary amounts, and particularly the variations toward very low amounts, which come largely from the Southern States.

It is not desirable to raise the salaries for school years of less

than the standard length, for the reason that, after all, the salary as it stands is, in most cases, the teacher's income. We do not know that he gets or can get a proportionate increase by utilizing the excess of leisure that he has. He probably very rarely does. It seems best, then, to omit any hypothetical correction of the data and to trust to the reader to remember that the average length of year for which the salaries stated are given is somewhat under the standard 180 school days, and also that some of the very low salaries are for short years. The length of year is not much below the standard, for the schools concerned are high schools, very few of which are situated in communities unable to support a full school year; and the very lowest salaries are often for a standard school year.

### *Errors in the Amount of Education Reported*

The reports on the amount of education are the least secure and unambiguous. There is, on the one hand, a tendency to neglect the definite request to include years in high school in the computation. A record of 4 years in high school and 4 years beyond high school in the alternative form will thus be sometimes counted in the "4 up to 6 years" column instead of the "8 years" column. There is also a tendency to misunderstand the meaning of "up to" as "up through," and thus to score 4 years in the "2 up to 4 years" column, 6 years in the "4 up to 6 years" column and so on. The form of the blank was designed to give opportunity for properly counting parts of a year (as, for instance, attendance on summer sessions), but it would have been a less evil, perhaps, to have used the headings "1 year," "2 years," "3 years," "4 years," "5 years," and so on. There is, on the other hand, a tendency to estimate, as belonging to high school education, years which should, by the customary definitions, count only as elementary education, and to estimate as collegiate

education years which, by the customary definitions, should count only as secondary education. The alternative form gives a check upon the first two of these errors of the reporting officers in the many cases where it, as well as the upper part of the special form, is filled out.

In the cases where it is not filled out, usually cases of large schools, the internal evidence of the record or knowledge obtained from other sources can serve as a check. If, for instance, in a large Massachusetts high school we have a record like the following:

| 2 up to 4 | 4 up to 6 | 6 up to 8 | 8 up to 9 | 9 |
|---|---|---|---|---|
| 0 | 2 | 7 | 2 | 0 |

it is almost a certainty that the reporting officer put the sixes in the "4 up to 6" column, the eights in the "6 up to 8" column. For the completion of four years in high school and four years in college is so general amongst the teachers in Massachusetts high schools that the existence of a school of 11 teachers with only 2 of that degree of education is far less likely than the existence of error in the report.

In estimating the condition of the secondary school staff in general with respect to length of education from the returns of the present census I have, where both are given, taken the alternative form record in preference to the general distribution, have eliminated teachers in elementary grades, and have omitted from the calculation cases where it seemed highly probable that the reporting officer misunderstood the blanks; but I have not interfered with the reporting officer's judgment as to what constitutes elementary education or education in advance of it. If the undetected misunderstandings of the request to include high school education and of the meaning of "up to" outweigh the overestimations of the length of teachers' education beyond a typical elementary school, the general results will rate the length of the

education of secondary school teachers too low. If the reverse is the case, they will rate it too high.

I have gone to the pains of measuring the influence of these combined opposite errors in the case of public high schools by a special inquiry sent to 1,000 individual teachers. . . .

The returns from this special inquiry show that in the case of public high schools neither of these errors is of great magnitude in the original reports, and that they nearly counterbalance each other.

### *Errors in the Length of Experience Reported*

The reports concerning length of experience in teaching are subject to five sources of error, one of which is important. These are: First, the tendency to report roughly, especially in round numbers; second, the tendency to avoid a statement of 0 years; third, the possible tendency of some women to reduce the number of years; fourth, the tendency of a school system to be generous in rating its staff for amount of experience; and fifth, the tendency to report the number of years of experience in the present school system, instead of the total number. This last source of error is the important one, because its frequency and its amount of influence cannot well be measured. For the other four, rational allowances can be made, so that no one of them does any harm of consequence. But the magnitude of the influence of the fifth, due to misunderstandings of individuals or recording officers, cannot be foretold. I have therefore gone to some pains to measure it with the help of the special inquiry described above.

The special inquiry shows that the error of reporting experience in the present school only is very rare in the case of the individualized returns, being made by only about one teacher in fifty. It is probably somewhat more frequent in the cases where the general table is made out by the school principal or secretary.

There is another tendency which is not really an error, except

in view of the wording of the blank, and of the fact that in the presentation of the data it is desirable to estimate the length of experience up to the year in which the given salary is received. This in the tendency of a person whose career is, say, 1904-5, first year of teaching, salary $500; 1905-6, second year of teaching, salary $600; 1906-7, third year of teaching, salary $725—to report, salary, $725; experience, three years. This occurs in over a third of the cases.

If the reader will bear in mind the nature of the data, he will nowhere be misled by the summaries that follow. In cases where the conclusions are subject to any considerable influence from the above mentioned sources of error in the original reports, the fact will be stated.

### *The Teaching Staff of Public Secondary Schools*

*Salaries.* The salaries of men teachers in public high schools range from less than $300 to $3,500. If the principals of the schools are included the upper limit becomes $5,000. There is no one salary that can properly be called typical in the sense of representing a tendency about which all the salaries cluster closely. If one were compelled to choose one amount as the most likely amount to be received by a teacher or principal (in the vast majority of our high schools the principal is a working teacher, giving much over half of his time to class instruction and class management), the amount would be $700. Their median salary is $900; that is, of the men engaged in public high-school work there are as many who receive less than $900 as there are receiving more than $900. Of a hundred such men 5 receive less than $500, 51 receive from $500 up to $1,000, 27 from $1,000 up to $1,500, 10 from $1,500 up to $2,000, and 7 from $2,000 up. Over half (53 per cent) of them receive from $600 to $1,000, inclusive.[1]

[1] The $1,000–$1,099 group is composed, to about four-fifths of its membership, of salaries of exactly $1,000.

Figure 13 repeats these facts, and gives at a glance the general financial status of the men engaged in public high schools in the United States.

The salaries of women engaged in public high-school work range from less than $200 to the group $2,500–$2,999. As with the men, there is no one salary amount which is typical in the sense of representing a true central tendency; $550 would be the most

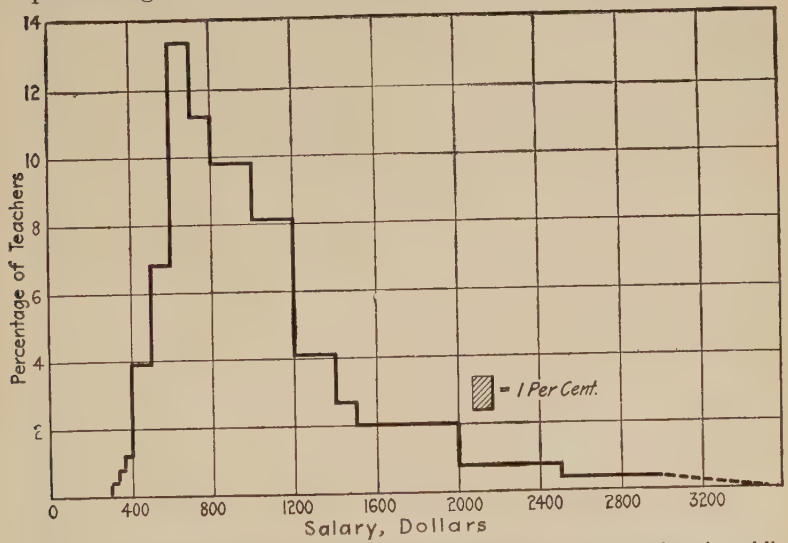



FIG. 13.—Relative frequencies of different annual salaries of men teachers in public high schools. The horizontal line is a scale of salary amounts from 0 up. The total area enclosed within the heavy line and the base line equals 100 per cent. The dash line is derived from estimates from too few cases to be very reliable.

suitable choice if a choice had to be made. Nor would it be so misleading as the corresponding $700 would be in the case of men; for half of the salaries are between $400 and $675, inclusive. The median salary is $650. Of a hundred women 22 receive less than $500, 59 from $500 up to $1,000, 14 from $1,000 up to $1,500, and 5, $1,500 and over. Figure 14 summarizes the general financial status of women engaged in public high-school work.

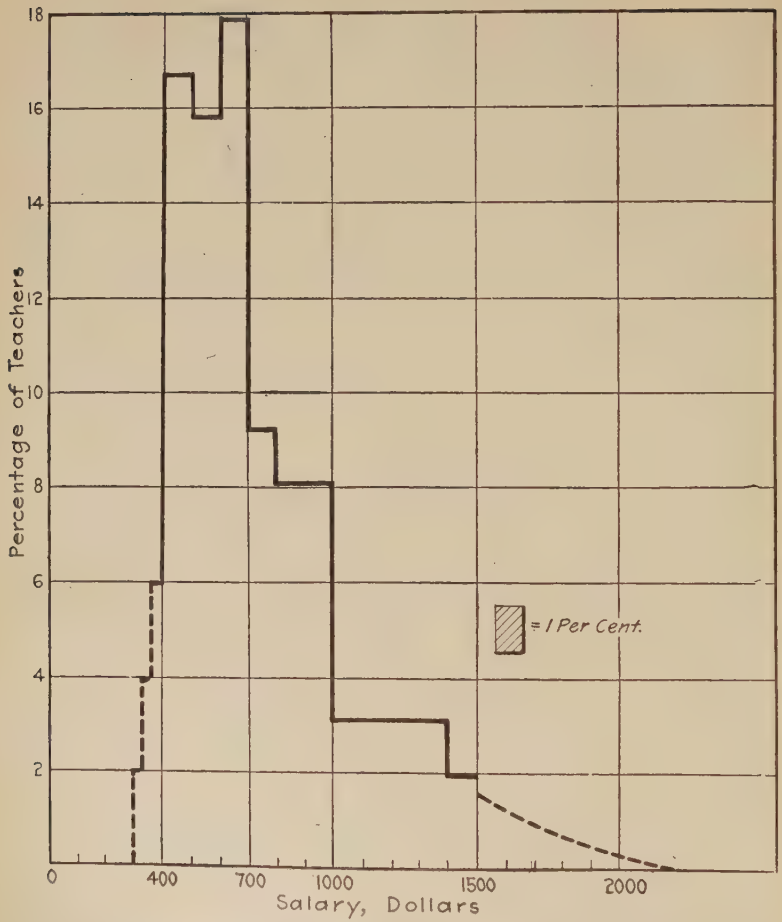



FIG. 14.—Relative frequencies of different annual salaries of women teachers in public high schools. For explanation of the diagram, see the legend of figure 13.

*The Teachers' Education.* The number of years that the man engaged in secondary school work spent as a student in high school, normal school, college, or other institution beyond the

elementary school ranges from 0 to 13, or possibly higher in a few cases. There is no close adherence to any one type the country over, though 8 years is the most common length. The median length is 7 years. Of a hundred men 10 have had less than 4 years beyond the elementary school, 45 have had from 4 up to 8 years,

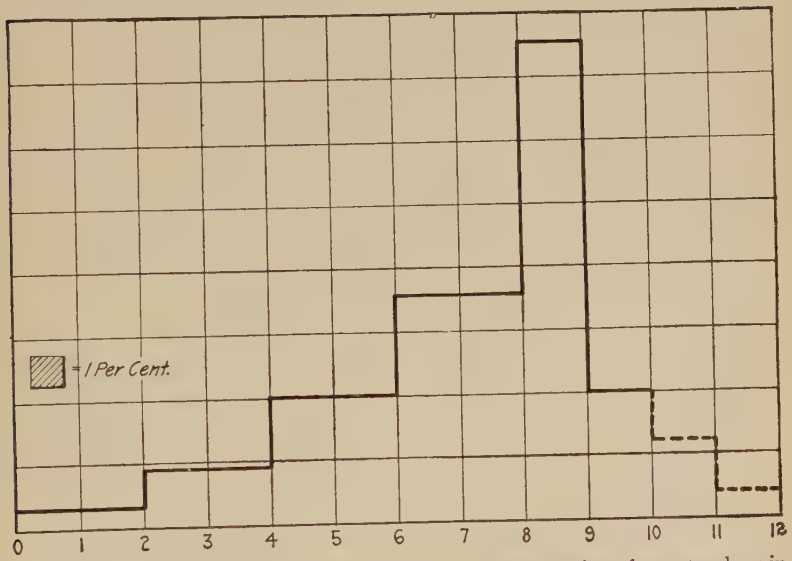



FIG. 15.—Relative frequencies of different amounts of education of men teachers in public high schools. The horizontal line is a scale of length of education beyond the elementary school (in years). The dash line is derived from estimates from too few cases to be entirely reliable.

30 have had 8 years, and 15 have had 9 years or more. Three-fifths have had 6, 7, or 8 years. Figure 15 shows the facts.

The length of education beyond the elementary school in the case of women teachers ranges from 0 to 12 years, or possibly higher in a few cases. The typical condition is 8 years. There are somewhat more women who have had 8 years or more than who have had 7 years or less. Of a hundred women, 6 or 7 have had less than 4 years beyond the elementary school, 40 or

41 have had from 4 up to 8 years, 41 to 42 have had 8 years, and 11 or 12 have had 9 years or more. Figure 16 shows the facts.

*Experience in Teaching.* The amount of experience in teaching,

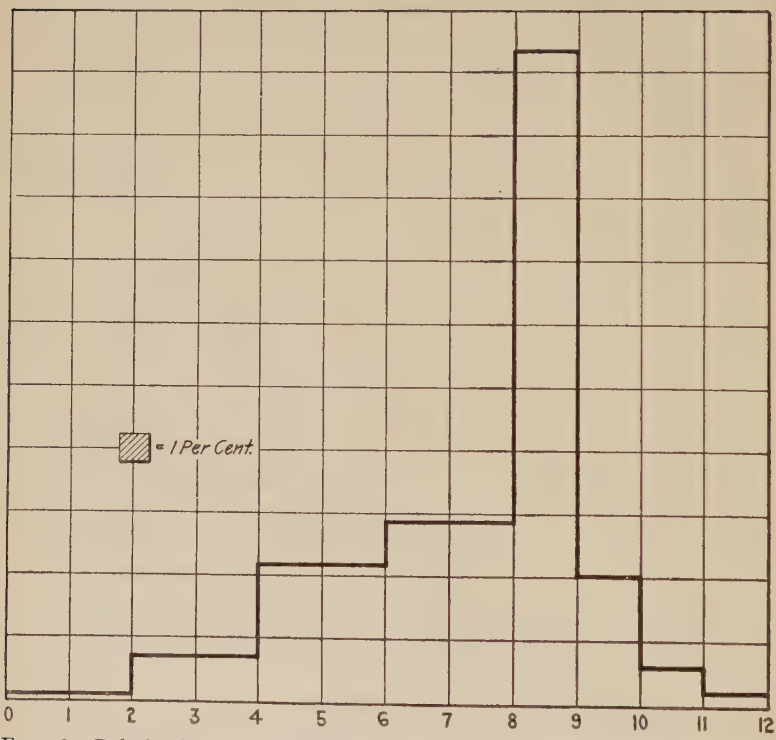



FIG. 16.—Relative frequencies of different amounts of education of women teachers in public high schools. For explanation of the diagram see the legend of figure 15.

previous to the year for which the salary was reported, as measured in years, ranges for the men from 0 to beyond 50, though there are only about three in a hundred who have taught over 30 years. The inquiry for a typical length would, of course, be

absurd. The median is probably 8 years. That is, as many public high-school men have taught over 9 years as have taught 7 years or less. Table 37 gives the facts as reported concerning the amount of experience of the men teachers and principals.

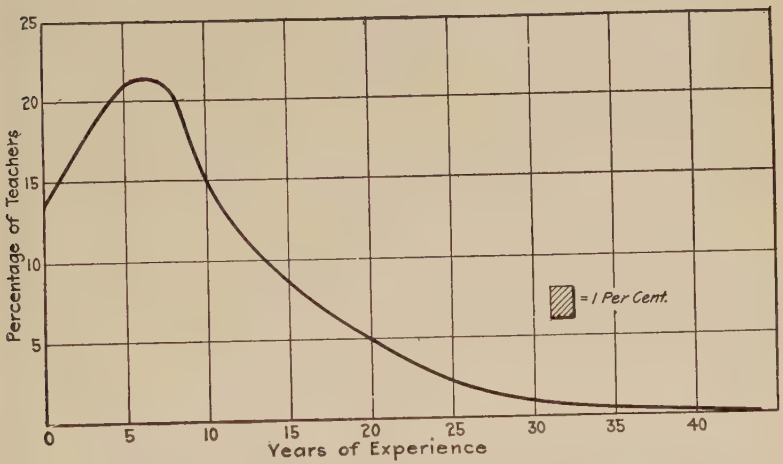



FIG. 17.—Relative frequencies of different amounts of experience in teaching of men teachers in public high schools. The total area between the heavy line and the base line equals 100 per cent.

Figure 17 gives the same facts corrected for the tendency to rough report and to over report round numbers, and also for the tendency to report the length of experience in the present position, to report cases of 0 years inaccurately, and to include the year for which the salary reported was received.

The length of experience ranges, for women, from 0 years to beyond 50, with about two in a hundred who have taught over 30 years. The median is probably 6 years. That is, probably as many public high-school women have taught 7 years or more

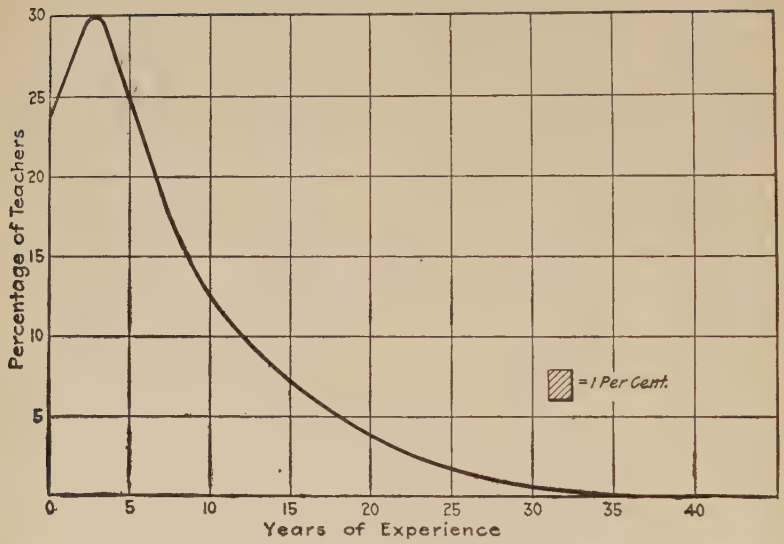



FIG. 18.—Relative frequencies of different amounts of experience in teaching of women teachers in public high schools.

as have taught 5 years or less. Table 37 gives the facts as reported. Figure 18 corresponds to Figure 17, giving for women the same information that Figure 17 gives for men.

TABLE 37

RELATIVE FREQUENCIES OF DIFFERENT AMOUNTS OF EXPERIENCE IN TEACHING IN THE CASE OF TEACHERS IN SECONDARY SCHOOLS AS REPORTED (IN PERCENTAGES)

| Years of Experience in Teaching | Teachers in Public Secondary Schools | | | | Teachers in Private Secondary Schools | | | |
|---|---|---|---|---|---|---|---|---|
| | Men | | Women | | Men | | Women | |
| Less than 1 | 2.9 | | 5.5 | | 4.1 | | 6.4 | |
| 1 | 5.2 | | 6.8 | | 6.6 | | 7.4 | |
| 2 | 5.5 | 25.8 | 9.4 | 38.6 | 10.0 | 35.4 | 8.8 | 39.0 |
| 3 | 6.0 | | 9.0 | | 6.9 | | 8.2 | |
| 4 | 6.2 | | 7.9 | | 7.8 | | 8.2 | |
| 5 | 7.7 | | 7.9 | | 5.7 | | 7.2 | |
| 6 | 6.3 | | 6.7 | | 4.9 | | 7.2 | |
| 7 | 6.5 | 29.9 | 6.1 | 28.7 | 4.5 | 24.3 | 3.3 | 27.2 |
| 8 | 6.3 | | 4.8 | | 5.1 | | 7.2 | |
| 9 | 3.1 | | 3.2 | | 4.1 | | 2.3 | |
| 10–14 | 20.4 | | 15.1 | | 14.0 | | 14.8 | |
| 15–19 | 12.0 | | 9.0 | | 8.0 | | 9.9 | |
| 20–24 | 5.9 | | 5.1 | | 8.8 | | 3.7 | |
| 25–29 | 2.2 | | 1.7 | | 5.7 | | 2.9 | |
| 30–34 | 1.7 | | 1.5 | | 1.6 | | 1.0 | |
| 35 and over | 1.4 | | .4 | | 2.3 | | 1.6 | |

### *Men Teachers and Women Teachers Compared.*[1]

Figures 19, 20 and 21 show the differences between men and women engaged in public secondary education with respect to salaries, amount of education, and amount of experience, as reported. That men are paid more is of course a familiar fact, but that they have less education as a preparation has been unnoticed, and that they remain in teaching so little longer than women is a fact which flatly contradicts common opinion. It is also to be

[1] The influence of the sources of error described earlier is so nearly the same for men and for women that the comparison may be made from the data as reported without risk of any error worth considering.

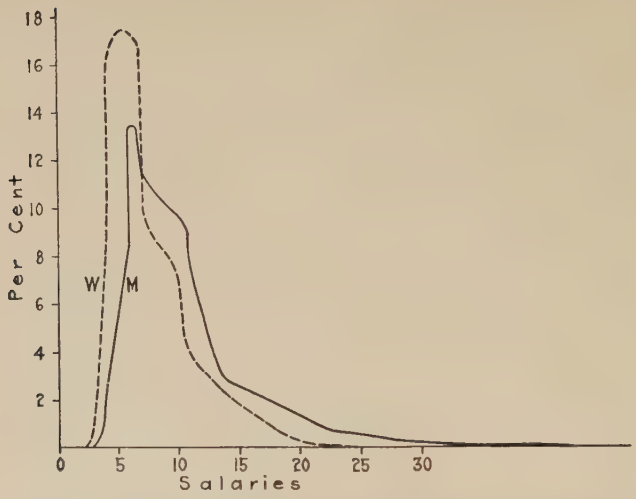



FIG. 19.—Men and women teachers in public high schools compared with respect to salaries. The continuous line incloses the surface of frequency for men's salaries. The dotted line incloses the surface of frequency for women's salaries. The horizontal scale gives the salaries in hundred of dollars.

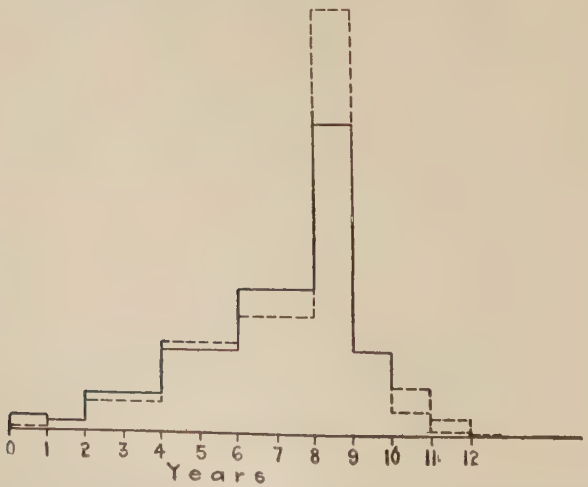



FIG. 20.—Men and women teachers in public high schools compared with respect to amount of education. The continuous line refers to men; the dotted line to women. The horizontal scale gives the number of years of education beyond the elementary school.

noted that there is not so much difference in the pay for the same (or ostensibly the same) work as the average salaries usually quoted mislead one into believing. The average salaries are compounded in part of, and overinfluenced by, the few large

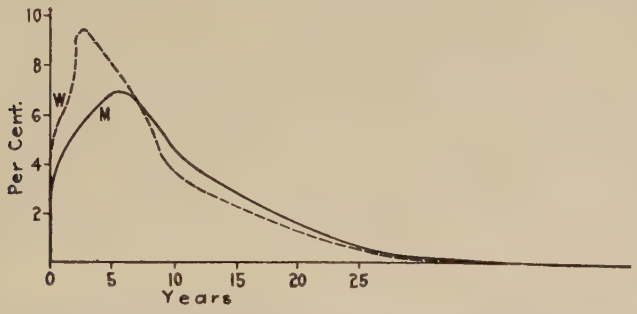



FIG. 21.—Men and women teachers in public high schools compared with respect to length of experience in teaching. The continuous line refers to men; the dotted line to women.

salaries paid to heads of departments, principals, and those whom we may call "managing teachers," who, without official recognition in title, are expected to do the lion's share in the organization and control of the school. All these are much more often men than women. Consequently, whereas in our group the average salary of a man is about 41 per cent greater than that of a woman, the modal salary (that is, the most frequent or most typical salary) is only 33.3 per cent greater.

### *Public and Private Secondary School Teachers Compared*

It is a well known fact that public secondary education has been increasing more rapidly than private in respect to number of students, number of teachers, annual expenses, and the like. It is therefore of interest to compare the two with respect to the present condition of the teaching staff.

If the reports from public high schools in general and from

private high schools in general are compared, one gets the following results: The public high school men teachers are paid about a tenth less and have had, roughly, a half year less of education. The public high school women teachers, on the contrary, are paid about a tenth more than the private high school women, and have had, roughly, a year more of education. In length of experience there is no appreciable difference.

But such a comparison may be misleading, if taken at its face value, for two reasons. First, a much smaller proportion of the private schools send the information, and, as already remarked, there are good reasons for believing that those which withhold it are not quite so well off in the pay they give to their teachers or the amount of education which their teachers have received as those which do report. In the second place, the less well paid and less well trained teachers in the public high schools are found in the rural high schools with one or two teachers. In one sense it is fair to compare these schools with the private high schools and academies, as they are both coöperating in secondary education. In another sense it is not fair, because the private schools often require residence away from home at a distance. Under the same conditions the pupils of public high schools could attend a public high school much better equipped than the one-teacher or two-teacher schools in their immediate neighborhood. That is, to make the comparison by the general census perfectly fair, there should be private high schools distributed geographically in just the same fashion as the public high schools.

I have, therefore, made the comparison by taking public and private secondary schools where both exist in the same locality, asking, that is, the question, "In any one city, will the pupil who attends the local public secondary school be taught by a staff as well paid and as well educated as the pupil attending the local private secondary school?" Since the matter is not one of very great importance to educational welfare, I have measured

the difference in only 19 cities. The fact in these is, with almost entire uniformity, that the staff of the public school is better paid. Whether each city is given a weight proportional to its size or is weighted like all the others, the general result is found that the public high school man is paid at least 15 per cent more than the private high school man, and the public high school woman at least 30 per cent more than the private high school woman. The facts appear in Table 38. The public high school teachers in these cities have also had a more extended education though, in view of the influences described on pages 117-119, it is not possible to assign an exact percentage.

TABLE 38

RELATIVE FREQUENCIES OF DIFFERENT SALARIES IN PUBLIC AND PRIVATE SECONDARY SCHOOLS IN THE SAME LOCALITIES. PERCENTAGES ESTIMATED FROM NINETEEN CITIES

| SALARIES | MEN | | WOMEN | |
|---|---|---|---|---|
| | Public Schools | Private Schools | Public Schools | Private Schools |
| Less than $500 | 0 | 1 | 1 | 10 |
| $500 to $999 | 4 | 24 | 26 | 59 |
| $1,000 to $1,499 | 34 | 32 | 49 | 27 |
| $1,500 to $1,999 | 31 | 22 | 21 | 3 |
| $2,000 and over | 31 | 21 | 3 | 2 |

## § 13. The Influence of the Sex Balance of the Teaching Staff upon High School Enrollment [1]

It always is, or should be, interesting to put speculations about education to the test of facts. The result often is, or should be, a warning to us against the intellectual crime of giving mere opinions where indolence is our only excuse for failing to verify them.

In the present article I propose to seek light on the very common opinion that the ratio of boys to girls in high schools, and in particular in the later grades of high schools, can be largely increased by increasing the percentage of men teachers in these schools.

The first question of fact which will be answered is: "Do the high schools which, while roughly alike in other respects, differ greatly in the proportion of male teachers, show corresponding differences in the proportion of male students?" The data used will be the statistics of public high schools in the 1906 Report of the U. S. Commissioner of Education. To get groups roughly alike, I omit, of course, schools for boys only or for girls only, manual training high schools, even though a few girls may be enrolled, and also, to avoid the possible admixture (through error) of teachers whose work is really in the elementary schools, all schools reported as having fewer than six secondary teachers. Further I keep separate the schools of each size, though in the summaries reported in the tables this separation is abandoned to save space and add to clearness.

I shall in general measure the proportion of boys among the

[1] This section is quoted with some abbreviation of tables, from an article with the same title in the *Educational Review* of Jan., '09 (Vol. XXXVII, No. I), by Edward L. Thorndike.

## TABLE 39

SAMPLE OF THE DATA AND CALCULATIONS IN THE CASE OF THE RELATION OF THE PROPORTION OF MALE TEACHERS TO THE PROPORTION OF MALE STUDENTS IN PUBLIC HIGH SCHOOLS. TWELVE-TEACHER SCHOOLS

| School | Number of Male Teachers | Number of Female Teachers | Percentage of Male Teachers | Number of Male Students | Number of Female Students | Percentage which the Number of Female Students is of the Number of Male Students |
|---|---|---|---|---|---|---|
| 1 | 1 | 11 | 8.3 | 128 | 210 | 164 |
| 2 | 2 | 10 | 16.7 | 167 | 162 | 97 |
| 3 | 3 | 9 | 25 | 165 | 171 | |
| 4 | 3 | 9 | | 111 | 110 | |
| | | | Sums | = 276 | 281 | 102 |
| 5 | 4 | 8 | 33.3 | 93 | 132 | |
| 6 | 4 | 8 | | 137 | 153 | |
| 7 | 4 | 8 | | 146 | 179 | |
| 8 | 4 | 8 | | 121 | 215 | |
| 9 | 4 | 8 | | 100 | 145 | |
| 10 | 4 | 8 | | 133 | 162 | |
| 11 | 4 | 8 | | 130 | 238 | |
| | | | Sums | = 860 | 1224 | 142 |
| 12 | 5 | 7 | 41.7 | 125 | 152 | |
| 13 | 5 | 7 | | 104 | 137 | |
| 14 | 5 | 7 | | 119 | 154 | |
| 15 | 5 | 7 | | 145 | 138 | |
| 16 | 5 | 7 | | 124 | 134 | |
| 17 | 5 | 7 | | 80 | 98 | |
| 18 | 5 | 7 | | 113 | 128 | |
| 19 | 5 | 7 | | 126 | 187 | |
| 20 | 5 | 7 | | 109 | 147 | |
| 21 | 5 | 7 | | 129 | 243 | |
| | | | Sums | =1174 | 1518 | 129 |
| 22 | 6 | 6 | 50 | 123 | 200 | |
| 23 | 6 | 6 | | 98 | 116 | |
| 24 | 6 | 6 | | 100 | 143 | |
| 25 | 6 | 6 | | 165 | 176 | |
| 26 | 6 | 6 | | 96 | 172 | |
| 27 | 6 | 6 | | 115 | 118 | |
| | | | Sums | = 697 | 925 | 133 |
| 28 | 7 | 5 | 58.3 | 147 | 164 | |
| 29 | 7 | 5 | | 172 | 215 | |
| | | | Sums | = 319 | 379 | 119 |
| 30 | 9 | 3 | 75 | 172 | 215 | 25 |

TABLE 40

THE RELATION OF THE SEX-BALANCE OF THE STAFF TO THE SEX-BALANCE OF THE STUDENT ENROLLMENT IN PUBLIC HIGH SCHOOLS OF FROM 6 TO 16 TEACHERS

| Number of Male Teachers | Number of Female Teachers | Number of Male Students | Number of Female Students | Number of Female Students Divided by Number of Male Students (×100) | Per Cents of Male Teachers | Corresponding Per Cents which Female Students are of Male Students | Per Cents of Male Teachers | Corresponding Per Cents which Female Students are of Male Students |
|---|---|---|---|---|---|---|---|---|
| 0 | 11 | 125 | 178 | 142 | 0 | 158 | 0–35 | 143 |
| 0 | 8 | 72 | 133 | 185 | | | | |
| 0 | 7 | 113 | 159 | 141 | | | | |
| 0 | 6 | 271 | 450 | 166 | | | | |
| 1 | 12 | 171 | 213 | 125 | 8–17 | 146 | | |
| 1 | 11 | 128 | 210 | 164 | | | | |
| 1 | 10 | | | | | | | |
| 1 | 9 | 100 | 118 | 118 | | | | |
| 1 | 8 | 829 | 1,355 | 163 | | | | |
| 1 | 7 | 1,158 | 1,626 | 140 | | | | |
| 2 | 14 | 309 | 519 | 168 | | | | |
| 2 | 13 | 177 | 241 | 136 | | | | |
| 1 | 6 | 1,690 | 2,403 | 142 | | | | |
| 2 | 12 | 399 | 559 | 140 | | | | |
| 2 | 11 | 414 | 755 | 182 | | | | |
| 1 | 5 | 2,741 | 3,942 | 144 | 17–24 | 145 | | |
| 2 | 10 | 167 | 162 | 97 | | | | |
| 2 | 9 | 963 | 1,338 | 139 | | | | |
| 3 | 13 | 538 | 843 | 157 | | | | |
| 2 | 8 | 1,046 | 1,635 | 156 | | | | |
| 3 | 12 | 516 | 629 | 122 | | | | |
| 3 | 11 | 682 | 967 | 145 | | | | |
| 2 | 7 | 1,633 | 2,364 | 145 | | | | |
| 3 | 10 | 1,242 | 1,756 | 141 | | | | |
| 2 | 6 | 1,968 | 2,863 | 145 | 25–29 | 143.5 | | |
| 3 | 9 | 276 | 281 | 102 | | | | |
| 4 | 12 | 162 | 291 | 180 | | | | |
| 4 | 11 | 638 | 1,045 | 164 | | | | |
| 3 | 8 | 945 | 1,489 | 158 | | | | |
| 2 | 5 | 2,870 | 3,974 | 138 | | | | |
| 4 | 10 | 897 | 1,155 | 129 | | | | |
| 3 | 7 | 2,129 | 2,893 | 136 | 30–35 | 140.5 | | |
| 4 | 9 | 314 | 351 | 112 | | | | |
| 5 | 11 | 209 | 221 | 106 | | | | |
| 2 | 4 | 6,130 | 8,735 | 142 | | | | |
| 3 | 6 | 1,564 | 2,358 | 151 | | | | |

TABLE 40—*Continued*

| Number of Male Teachers | Number of Female Teachers | Number of Male Students | Number of Female Students | Number of Female Students Divided by Number of Male Students (×100) | Per Cents of Male Teachers | Corresponding Per Cents which Female Students are of Male Students | Per Cents of Male Teachers | Corresponding Per Cents which Female Students are of Male Students |
|---|---|---|---|---|---|---|---|---|
| 4 | 8 | 860 | 1,224 | 142 | | | | |
| 5 | 10 | 342 | 396 | 116 | | | | |
| 5 | 9 | 396 | 591 | 149 | | | | |
| 4 | 7 | 2,098 | 2,780 | 133 | 36–40 | 142 | 36–40 | 142 |
| 3 | 5 | 3,101 | 4,656 | 150 | | | | |
| 6 | 10 | 1,094 | 1,474 | 135 | | | | |
| 5 | 8 | 465 | 615 | 132 | | | | |
| 4 | 6 | 858 | 1,269 | 148 | | | | |
| 6 | 9 | 177 | 260 | 147 | | | | |
| | | | | | | | 41–91 | 140 |

The original table continues up to schools with 91 per cent of their teachers men, 184,000 students being recorded. For the schools having from 40 to 91 per cent of their teachers men, the female students stand to the males in the ratio of 140 to 100.

students indirectly by the percentage which the girls enrolled are of the boys, as this saves much computation.

Table 39 shows the nature of the data used and the calculations made by one sample.

Table 40 summarizes the facts from schools with from six to sixteen teachers, inclusive.

Table 40 shows that there is only a very, very slight direct relation between the proportion of male teachers and the proportion of male students. With the 184,000 students recorded, the percentage of boys is less than 4 per cent more amongst the 84,607 in schools with from 40 per cent to 91 per cent of men teachers than amongst the 81,527 in schools with from 0 per cent to 35 per cent. The very few schools with no men teachers at all and those with over half of the staff men show decided differences, but the numbers are too small to be used as reliable evidence. Schools with from 30 to 50 per cent of men teachers show no

change in the percentage of boys. The general drift of the relation is such as may be expressed as follows:—The central tendency is to have 3 out of 8 teachers men and to have 142 girls for every 100 boys enrolled. For 33 1-3 per cent increase in the proportion of male teachers, one finds an increase of less than 1 per cent in the proportion of male students; for 66 2-3 per cent increase in the former proportion, one finds an increase of 2 per cent in the latter; and for an increase of 100 per cent in the former, an increase of 4 or 5 per cent in the latter. Where the former proportion is halved the proportion of male students drops only about 1 per cent and where it is reduced to a third, the drop in the latter is less than 2 per cent.

I have also computed the facts in the case of the 42 schools of 13 or more teachers (in 1906) having a percentage of male teachers of 24 or under and the 41 such schools having a percentage of male teachers of 47 or over. Although on the average the latter group have two and a half times as high a percentage of male teachers, they have a percentage of male students hardly any higher and a percentage of male graduates which is decidedly *lower* than is found in the schools with few men teachers. The facts are:

| | Schools with from 11 to 24 Per Cent of Male Teachers | Schools with from 47 to 65 Per Cent of Male Teachers |
|---|---|---|
| Number of male students | 9,117 | 9,210 |
| Number of female students | 12,687 | 12,667 |
| Number of male graduates | 986 | 746 |
| Number of female graduates | 1,480 | 1,444 |
| Per cent of male students | 42— | 42+ |
| Per cent of male graduates | 40 | 34 |

Evidently the influence of the proportion of male teachers upon the proportion of male students, even when combined with whatever unreasoning tendency there is for school boards to provide a larger share of men teachers when the enrollment consists largely of boys and with the tendency of certain communities to

look with disfavor on the feminization of both the teaching profession and the school population, is very slight.

Its influence upon the proportion of each sex remaining through the high school might still, however, be demonstrable. The fact here could be best ascertained by a calculation of the correlation between the percentage of male teachers and a rather complex ratio, namely $\frac{\frac{B_4}{B_1}}{\frac{G_4}{G_1}}$ in which $B_4$ equals the enrollment of boys in the fourth year of high school, $B_1$ the enrollment of boys in the first year of high school, $G_4$ the enrollment of girls in the fourth year of high school, $G_1$ the enrollment of girls in the first year of high school. The calculation of this ratio for each school or group of schools with the same percentage of male teachers would, however, be a very laborious procedure and could at the best be done in the case of only the small proportion of schools which report enrollment by grades in the 1907 Report of the U. S. Bureau of Education. I have, therefore, taken a somewhat less significant but more easily and more widely available measure, namely the ratio which the male graduates are of the total graduates, using the data of the 1906 Report of the U. S. Commissioner of Education.

I shall then answer this second question of fact: "Do the high schools which differ greatly in the proportion of male teachers show corresponding differences in the proportion of male graduates?"

Table 41 summarizes the facts concerning this relationship. Of the 9,782 graduates in schools with from 0 to 33 1-3 per cent of their teachers men nearly 37 per cent are boys, and of the 9,421 graduates in schools with from 35.7 to 91 per cent of their teachers men almost exactly 37 per cent are boys. The differ-

ence is one-third of one per cent. The proportion of male teachers thus makes even less difference in the proportion of male graduates than in the proportion of male students as a whole. It appears, then, that the influence which made the slight correlation between the sex ratio of the staff and that of the student body was not in the main the attractiveness of men teachers to boys. For, in so far as it was that, the relation should be closer for graduates upon whom the supposed attractive force would have acted from one-half to three and a half years longer.

These facts are adequate to prove that in the medium sized public high schools of the country the proportion of boys who go to or stay through high school is almost or wholly irrespective of the percentage of men on the staff of the school. But since there is an independent body of evidence available which is interesting from other points of view as well as our present one, I shall present it also. This evidence is the change for each school in the percentage of male teachers in recent years taken in connection with the change for each school (1) in the percentage of male students and (2) in the percentage of male graduates. We may, that is, get the answer to the question: "To what extent have the schools which have been most feminized in their staffs been also most feminized in their student body and in their body of graduates?" I shall, in answering it, use first the reports of 1896 and 1906 for the co-educational public high schools (excluding evening high schools) in cities where there is one general high school of 12 or more teachers (in 1906).

TABLE 41

THE RELATION OF THE SEX-BALANCE OF THE STAFF TO THE SEX-BALANCE OF THE GRADUATES (FOR 1906) IN PUBLIC HIGH SCHOOLS OF FROM 6 TO 16 TEACHERS [1]

| Number of Male Teachers | Number of Female Teachers | Number of Male Graduates | Number of Female Graduates | Number of Female Graduates Divided by Number of Male Graduates (×100) | Per Cents of Male Teachers | Corresponding Per Cents which Female Graduates are of Male Graduates. | Per Cents of Male Teachers | Corresponding Per Cents which Female Graduates are of Male Graduates |
|---|---|---|---|---|---|---|---|---|
| 0 | 11 | 7 | 15 | 214 | 0 | 212 | 0–33.3 | 173— |
| 0 | 8 | 6 | 11 | 183 | | | | |
| 0 | 7 | 7 | 9 | 129 | | | | |
| 0 | 6 | 28 | 67 | 239 | | | | |
| 1 | 12 | 15 | 19 | 127 | 8–17 | 169 | | |
| 1 | 11 | 10 | 36 | 360 | | | | |
| 1 | 10 | | | | | | | |
| 1 | 9 | 10 | 15 | 150 | | | | |
| 1 | 8 | 56 | 114 | 204 | | | | |
| 1 | 7 | 94 | 181 | 193 | | | | |
| 2 | 14 | 41 | 52 | 127 | | | | |
| 2 | 13 | 23 | 35 | 152 | | | | |
| 1 | 6 | 185 | 282 | 152 | | | | |
| 2 | 12 | 44 | 75 | 171 | | | | |
| 2 | 11 | 40 | 80 | 200 | | | | |
| 1 | 5 | 332 | 573 | 173 | 17–24 | 180 | | |
| 2 | 10 | 12 | 13 | 108 | | | | |
| 2 | 9 | 87 | 159 | 183 | | | | |
| 3 | 13 | 52 | 96 | 185 | | | | |
| 2 | 8 | 97 | 212 | 208 | | | | |
| 3 | 12 | 45 | 79 | 176 | | | | |
| 3 | 11 | 87 | 139 | 160 | | | | |
| 2 | 7 | 156 | 282 | 181 | | | | |
| 3 | 10 | 180 | 243 | 135 | 23–29 | 174 | | |
| 2 | 6 | 169 | 351 | 208 | | | | |
| 3 | 9 | 49 | 46 | 94 | | | | |
| 4 | 12 | 18 | 27 | 150 | | | | |
| 4 | 11 | 61 | 123 | 202 | | | | |
| 3 | 8 | 52 | 101 | 194 | | | | |

[1] The schools reported in Table 41 are not identical with those reported in Table 40, since (1) the number of graduates is less often recorded in the Report of the U. S. Comm. of Education, and (2) the labor of calculation was somewhat lightened by omitting at random a fourth of the schools of from six to eleven teachers.

TABLE 41—*Continued*

| Number of Male Teachers | Number of Female Teachers | Number of Male Graduates | Number of Female Graduates | Number of Female Graduates Divided by Number of Male Graduates (×100) | Per Cents of Male Teachers | Corresponding Per Cents which Female Graduates are of Male Graduates | Per Cents of Male Teachers | Corresponding Per Cents which Female Graduates are of Male Graduates |
|---|---|---|---|---|---|---|---|---|
| 2 | 5 | 277 | 521 | 188 | | | | |
| 4 | 10 | 95 | 153 | 161 | | | | |
| 3 | 7 | 202 | 350 | 173 | 30–35 | 166 | | |
| 4 | 9 | 21 | 58 | 276 | | | | |
| 5 | 11 | 27 | 35 | 130 | | | | |
| 2 | 4 | 704 | 1,168 | 166 | | | | |
| 3 | 6 | 169 | 292 | 173 | | | | |
| 4 | 8 | 103 | 138 | 134 | | | | |
| 5 | 10 | 27 | 44 | 116 | | | | |
| 5 | 9 | 43 | 69 | 161 | | | | |
| 4 | 7 | 225 | 427 | 190 | 36–40 | 180 | | |
| 3 | 5 | 334 | 681 | 204 | | | | |
| 6 | 10 | 147 | 189 | 129 | | | | |
| 5 | 8 | 60 | 103 | 172 | | | | |
| 4 | 6 | 95 | 153 | 161 | | | | |
| 6 | 9 | 15 | 23 | 163 | | | | |
| | | | | | | | 35·7–91 | 171+ |

The original table continues up to schools with 91 per cent of their teachers men. The per cents of female graduates corresponding to per cents of male teachers, 41–49, 50, 53–59, and 60–91, are respectively 176, 162, 161 and 171.

The quantities whose relationships are to be measured are three ratios for each school:

I. The ratio of the change in the number of men teachers to the change in the number of women teachers, the changes being measured by percentile increments.

II. The ratio of the change in the number of male students to the change in the number of female students, the changes being measured by percentile increments.

III. The ratio of the change in the number of male graduates to the change in the number of female graduates, the changes being measured by percentile increments.

These somewhat complex verbal descriptions represent, of course, the following arithmetical expressions:

$$\text{I.}\quad \frac{\text{M. T. '06.}}{\text{M. T. '96.}} = \frac{\text{F. T. '06.}}{\text{F. T. '96.}} \qquad \text{II.}\quad \frac{\text{M. S. '06.}}{\text{M. S. '96.}} = \frac{\text{F. S. '06.}}{\text{F. S. '96.}} \qquad \text{III.}\quad \frac{\text{M. G. '06.}}{\text{M. G. '96.}} = \frac{\text{F. G. '06.}}{\text{F. G. '96.}}$$

In which M. T., M. S., and M. G. stand for Male Teachers, Male Students, and Male Graduates respectively, and F. T., F. S., and F. G. stand for Female Teachers, Female Students, and Female Graduates.

The 204 schools examined show an enormous range of difference in the feminization of the staffs—from a case where 8 men and 2 women have been replaced by 7 men and 10 women (that is, a ratio of .11) to a case where 1 man and 15 women have been replaced by 15 men and 16 women (that is, a ratio of 14.10). The central tendency is to a change of 88 per cent as much in men as in women.

The range of difference in the feminization[1] of the student body is of course less, but is still large, roughly from a ratio of .60 to one of 2.00.

The exact relation between the changes in staff and the changes in the student body is not clear in spite of the fact that the data include (for 1906) over 100,000 students. The facts are summarized in Table 42. In general it is clear from them that the addition of men teachers has made very little difference, and very likely none at all, in the proportion of male students. The same, but to a less degree, is true in the case of the relation between changes in the sex-balance of the staff and changes in the sex-balance of the graduates. The facts are summarized in Table 43.

[1] In these large schools the boys increased somewhat more than did the girls during the ten years in question. The country over, the girls increased about one per cent more.

The work of calculation of these relationships is so excessively tedious, especially for small schools, that I have not attempted to measure the fact in enough more schools to make the determinations final and precise within, say, 1 per cent. But I have supplemented them by similar calculations for the schools which had 10 or 11 teachers in 1906, for 50 schools (taken at random) which had 6 teachers in 1896, and for 33 schools in Massachusetts which had 4, 5, or 6 teachers in 1896. The facts in these cases are summarized in Table 44.

TABLE 42

RELATION OF CHANGES IN THE SEX BALANCE OF THE STAFFS OF PUBLIC HIGH SCHOOLS TO CHANGES IN THE SEX BALANCE OF THE STUDENT BODY. IN 204 LARGE HIGH SCHOOLS.

| Change in Sex Balance of the Teaching Staff: $\frac{\text{M. T. '06}}{\text{M. T. '96}} \div \frac{\text{F. T. '06}}{\text{F. T. '96}}$ | Change in Sex Balance of the Student Body: $\frac{\text{M. S. '06}}{\text{M. S. '96}} \div \frac{\text{F. S. '06}}{\text{F. S. '96}}$ | Number of Students, in 1906, Involved in the Computation |
|---|---|---|
| 0– .29 | 1.16 | 3,209 |
| .30– .49 | 1.04 | 4,985 |
| .50– .69 | 1.07 | 21,393 |
| .70– .89 | .975 | 21,272 |
| .90–1.09 | 1.10 | 18,895 |
| 1.10–1.29 | 1.18 | 11,566 |
| 1.30–1.49 | 1.04 | 7,222 |
| 1.50–1.69 | 1.115 | 6,815 |
| 1.70–1.99 | 1.10 | 5,119 |
| 2.00 and over | 1.23 | 10,653 |
| **Under 70** | **1.08** | **29,587** |
| **1.30 and over** | **1.115** | **29,799** |
| **0– .70** | **1.08** | |
| **.70–1.29** | **1.06** | |
| **1.30–1.99** | **1.08** | |
| **2.00 and over** | **1.23** | |

TABLE 43

THE RELATION OF CHANGES IN THE SEX BALANCE OF THE STAFFS OF PUBLIC HIGH SCHOOLS TO CHANGES IN THE SEX BALANCE OF THEIR GRADUATES. IN 204 LARGE HIGH SCHOOLS.

| Change in Sex balance of the Teaching Staff: $\frac{\text{M. T. '06}}{\text{M. T. '96}} \div \frac{\text{F. T. '06}}{\text{F. T. '96}}$ | Change in Sex Balance of the Graduates: $\frac{\text{M. G. '06}}{\text{M. G. '96}} \div \frac{\text{F. G. '06}}{\text{F. G. '96}}$ | Number of Graduates, in 1906, Involved in the Comparison |
|---|---|---|
| 0– .29 | 1.07 | 453 |
| .30– .49 | .89 | 609 |
| .50– .69 | .96 | 2,321 |
| .70– .89 | 1.00 | 2,483 |
| .90–1.09 | 1.18 | 1,584 |
| 1.10–1.29 | 1.41 | 1,193 |
| 1.30–1.49 | 1.33 | 745 |
| 1.50–1.69 | 1.28 | 740 |
| 1.70–1.99 | 1.53 | 622 |
| 2.00 and over | .925 | 976 |
| Under .70 | .96 | 3,383 |
| 1.30 and over | 1.22 | 3,083 |
| 0– .70 | .96 | |
| .70–1.29 | 1.135 | |
| 1.30–1.99 | 1.36 | |
| 2.00 and over | .925 | |

TABLE 44

THE RELATION OF CHANGES IN THE SEX BALANCE OF THE STAFF TO CHANGES IN THE SEX BALANCE OF THE STUDENT BODY AND GRADUATES. SUMMARY OF ADDITIONAL DATA.

| | $\frac{\text{M. T. '06}}{\text{M. T. '96}} \div \frac{\text{F. T. '06}}{\text{F. T. '96}}$ | $\frac{\text{M. S. '06}}{\text{M. S. '96}} \div \frac{\text{F. S. '06}}{\text{F. S. '96}}$ | $\frac{\text{M. G. '06}}{\text{M. G. '96}} \div \frac{\text{F. G. '06}}{\text{F. G. '96}}$ |
|---|---|---|---|
| Schools of 10 and 11 teachers in '06. | 0– .95 | .97 | 1.02 |
| | .96–∞ | 1.10 | 1.215 |
| Schools of 6 teachers in '96. | 0– .70 | .91 | .93 |
| | .70– .99 | 1.13 | .81 |
| | 1.00–1.49 | 1.085 | 1.055 |
| | 1.50–∞ | 1.08 | 1.12 |
| Massachusetts schools of 4, 5 or 6 teachers in '96. | 0– .99 | 1.05 | .85 |
| | 1.00–∞ | 1.05 | .77 |

Taking all these facts together, it seems safe to say that in these larger schools changes of staff expressed by the ratios .50 and 2.00 (for instance, a change from 5 men and 5 women to 5 men and 10 women or from 5 men and 5 women to 10 men and 5 women) are not accompanied by corresponding changes in the student body of much more than 5 minus or plus (for instance, from 100 boys and 100 girls to 100 boys and 105 girls and to 105 boys and 100 girls.

In the case of the graduates the figures for similar changes in staff would be perhaps 7 plus or minus.

The possible influence of men teachers in attracting boys and holding them through the high school course, the possible influence of a habit of letting the sex balance of a school count as a reason for choosing a new teacher from one sex rather than the other, the influence of the addition of studies specialized for the sexes (such as manual training and domestic science) which, so far, are taught almost exclusively *by* the same sex that they are taught *to*, and other similar influences, have not all together been strong enough to account for more than a small fraction of the very great changes in the sex balance of these high schools. The influence first named must certainly have been very slight, for the one last named is real and must have been the cause of part of the slight correlation found.

The measurements made are perhaps even more interesting from other points of view than that of the attempt to verify or refute the opinion that replacing women teachers by men would help largely to turn the sex balance in our secondary schools.

As the author has in several instances shown, the variability of our schools, cities, states, and institutions in respect to different features of educational work is very instructive. It is in the present case. Taking such high schools as are in each case the only public secondary schools in the city or town and should do,

therefore, the general work of secondary education for the community, we find that for medium sized and large schools the percentage of male teachers varies from 0 to 75 and over. Are the extremes justifiable, each really adapted to the special needs of that community, or are they due to ignorance and caprice? We find that some schools have only half as high a percentage of boys as do others. Is this because the boys in these communities need education less, or because poverty debars boys from school so much more than girls, or because of an unwise administration of the school? If poverty does debar boys in excess, ought it to? We find that from '96 to '06 some cities have vastly increased the proportion of women on their high school staffs while others have vastly increased the proportion of men. Were both right because of local needs? Which group was right? Were perhaps both groups wrong?

We are not, at present, able to judge the worth of the feminization of secondary and higher education from its results. There is an intellectual difficulty in the absence of facts and an emotional difficulty in the presence of prejudices. But we could in part judge it by its relations—by what it goes with. And since a student of education who has got the ability to measure variable relationships commonly has had sufficient scientific experience to elevate him above conventional prejudices, this method might well be more impartially used than the direct method. The following questions can all be answered by energy and care: How do the most feminized and the most rapidly being feminized schools stand, in comparison with their opposites (in both present condition and recent progress), with respect to cost per pupil, number of teachers per hundred pupils, per cent of population enrolled, course of study, laboratory, library, and technical equipment, and other symptoms of efficiency? How do the communities in which they are stand (in both present condition and recent progress) with respect to public health protection, street lighting,

infant mortality, parks and libraries, provision of kindergartens and evening schools, crime, and the like?

Finally I may call attention to the fact that comparative studies of the changes in the school work of individual cities during the past ten, twenty, or thirty years are likely to be even more instructive than the comparisons of present status to which we have been accustomed to confine our attention. The latter portion of the present article is, I believe, the first attempt to use on a large scale the statistics of educational changes measured separately for each city or other educational unit.

Only those schools were taken which were co-educational, and which represented the entire system of public secondary education in the community. There were 204 in all, so that the comparison concerns roughly the top and bottom fifths with respect to the sex balance of the staff. The same method is available for far more important problems than that of the sex balance in schools. It should be applied to all administrative problems. An apparent lack of change in the country as a whole may be the result of enormous, but opposite, changes in different localities or institutions; and, of course, apparent general change in one direction may conceal similar enormous individual differences. By individualizing the measurements of change for different features of educational practice and correlating them, we may learn vastly more of their nature, and, under certain conditions, of their value.

# PART III

## STUDIES OF THE ORGANIZATION OF SCHOOLS AND COURSES OF STUDY

## § 14. The Elementary School Curriculum

The ends which we seek in education are realized by means of the curriculum, the methods of instruction and the organization and management of our schools. When schools were concerned primarily with the three R's, education was largely a matter of experience received outside of the schoolroom. It was inevitable that with the changed social conditions, the content of the school curriculum should be greatly increased. That the curriculum is the result of a demand originating outside of the teaching profession is shown clearly in Professor W. A. Jessup's "Social Factors Affecting Special Supervision." A part of his concluding statement follows:

"We have seen that the pressure which brought about the introduction of music was generated by the organization of public sentiment by people outside the school. The rapid introduction of drawing was traced to the influence of the public opinion directed by the manufacturers of Massachusetts and elsewhere. Economic and humanitarian forces united in consciously creating a pressure which resulted in the introduction of manual training and domestic science. The sudden rise in interest in physical education in the early nineties was traced to the organized activities of the German Turners, the Christian Associations and private munificence. While penmanship had a special value within the schoolroom, it did not take its place as a *sine qua non* until pressure was brought to bear from outside agitation.

"All of this is a striking commentary on the character of the school as a public institution and on its responsiveness to public opinion and certainly points clearly to the conclusion that these modifications in the curriculum have largely come from without

rather than from within the school group. The administrator who aspires to genuine leadership in school affairs surely cannot afford to neglect the conscious organization of public sentiment as one of his most powerful means of attainment of ends. The school is being constantly subjected to outside pressure and the superintendent must either yield to these forces or direct them. It is true that the factor of imitation has been operative in the later introduction so that in many cases the desire to be 'abreast of the times' has brought about the introduction of new subject matter irrespective of the fact that there was neither a public demand for this nor a clear conception of the purpose involved. However, since this refers to the later development, it does not affect the conclusions above. . . .

"We have seen the organized efforts of the Boston Academy of Music; the petition of the Massachusetts manufacturers, urging legislation relative to drawing, the New York Industrial Education Association spreading the propaganda for manual training and domestic science; the German Turners and others putting forth the claims for physical education. We have likewise noted that in almost every instance the expense of the initial experiment was borne by these organizations. After a further preparation of the public mind and proving the possibility of the venture, the second step was to effect joint control between the advocates of the new movement and the regular school authorities, followed by the complete adoption at public expense. In view of the facts presented in this study it would seem quite possible to introduce almost anything into the schools provided a few influential people became sufficiently interested to furnish the necessary funds for the development of public sentiment. This plan has met with uniform success in the past irrespective of the subject involved or the size of the city."

We are to-day adding industrial training to our curriculum beyond the sixth year and again the demand has come largely

from those who employ skilled labor. The current agitation for religious and moral training is due primarily to the fact that the church and the home are doing less for children in this field and that parents and religious leaders are hoping that the school will be able to make good this deficiency.

Along with the increase in the content of the curriculum has come the cry of "fads and frills" from those who see little significance in those aspects of school work which are not directly related to making a living. A more significant criticism, current among teachers and other careful students of education, declares that the curriculum is overcrowded. More time is needed for the more comprehensive training which the school attempts to give to-day. The curriculum is overcrowded largely because we are attempting to give *in school* in a five hour day the training which once occupied the greater part of the child's waking hours. The longer school day has already been introduced in many industrial schools which have the eight hour day. We may expect that a school which attempts to teach the three R's, geography, history, nature study, music, drawing, industrial and household arts and which plans at the same time to be responsible for the recreation of children will demand more than five hours a day.

The problem of the curriculum is not simply, What shall be included in the curriculum? but also, When shall each subject be begun and what part of the subject shall be assigned to each of the grades in which it is found? and, How much time shall be devoted to each subject in each grade? Dr. Bruce R. Payne's ['05] careful investigation of "Elementary School Curricula[1]" contains interesting data, a part of which is presented in the tables taken from his book presented below.[1]

[1] Payne, B. R., "Public Elementary School Curricula" published by Silver, Burdett and Company.

TABLE 45

THE PERCENTAGE OF TOTAL TIME GIVEN TO EACH STUDY IN THE PUBLIC ELEMENTARY SCHOOLS OF TEN AMERICAN CITIES

| | Boston | Chicago | Cleveland | Columbus, Ga. | Jersey City | Kansas City | Louisville | New Orleans | New York | San Francisco | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Opening Exercises | 2.9 | 1.6 | 1.7 | 5.1 | 3.7 | 1 | 1.9 | 1.5 | 5.7 | 4.4 | 3.1 |
| 2 Reading and Literature | 23.3 | 18.8 | 23.6 | 16.9 | 30 | 14.5 | 23.9 | 13.4 | 1 | 20.2 | 20.7 |
| 3 Writing | 1 | 4.8 | 5.4 | 4.1 | 6.8 | 9.6 | 4.6 | 4.1 | 5.5 | 5.1 | 4.7 |
| 4 Spelling | 2.4 | 3.3 | 5.6 | 6.3 | 2 | 10.7 | 5.7 | 5.1 | 2.9 | 7.2 | 4.7 |
| 5 Grammar | | | | | | | | | | | |
| 6 Language | | | | | | | | | | | |
| 7 Composition | 17.7 | 11.9 | 16.1 | 18.1 | 10.3 | 11.1 | 12.5 | 17.6 | 30.9 | 13.7 | 14.4 |
| 8 Arithmetic | 16.2 | 18.6 | 17.3 | 18.6 | 19.5 | 15.1 | 17.2 | 18.6 | 12 | 15.3 | 17.3 |
| 9 Geography | 5.5 | 6.1 | 6.2 | 10.7 | 6.7 | 7.5 | 9.8 | 8.9 | 4.3 | 6.9 | 7.2 |
| 10 History | | | | | | | | | | | |
| 11 Civil Government | 3.6 | 4.7 | 3 | 3.7 | 3.6 | 6.6 | 4 | 5.7 | 4.3 | 6.6 | 4.8 |
| 13 Elementary Science | | | | | | | | | | | |
| 14 Nature Study | 4.5 | 6.2 | 1.4 | | 3 | 3.1 | 2.7 | 4.5 | 5.6 | 3.9 | 3.4 |
| 15 Physiology | | | 2.3 | | 2 | | .7 | 1.7 | 2 | 3 | .7 |
| 16 Physical Training | 6 | 3.3 | 3.5 | | | | 2.4 | 3.6 | 8 | 4.1 | 4.7 |
| 17 Drawing | 7.1 | 4.8 | 5 | 4.2 | 6.4 | 11.5 | 6.4 | 4.1 | 9.6 | 5 | 6.4 |
| 18 Music | 4.3 | 4.9 | 4.9 | 4.3 | 3.9 | 10.6 | 5.5 | 4.3 | 4.6 | 5.3 | 5.1 |
| 19 Manual Training [4] | 5.8 | 1.5 | 2.3 | 4.4 | | | | | 5.4 | 4 | 2.4 |

[1] Included with language.
[2] Included with reading.
[3] Included with nature study.
[4] Includes cooking and sewing.

TABLE 46

THE AVERAGE TIME IN MINUTES PER WEEK GIVEN TO EACH SUBJECT IN EACH GRADE IN TEN AMERICAN CITIES

| Grade | I | II | III | IV | V | VI | VII | VIII |
|---|---|---|---|---|---|---|---|---|
| 1 Opening Exercises | 43 | 43 | 43 | 40 | 40 | 40 | 40 | 40 |
| 2 Reading and Literature | 443 | 404 | 367 | 373 | 232 | 160 | 142 | 129 |
| 3 Writing | 80 | 78 | 91 | 79 | 62 | 62 | 28 | 22 |
| 4 Spelling | 47 | 90 | 81 | 73 | 67 | 62 | 44 | 33 |
| 5 Grammar | | | | | | | | |
| 6 Language and | | | | | | | | |
| 7 Composition | 130 | 146 | 144 | 158 | 176 | 224 | 254 | 256 |
| 8 Arithmetic | 101 | 195 | 232 | 239 | 241 | 249 | 242 | 231 |
| 9 Geography | 11 | 20 | 53 | 156 | 164 | 150 | 127 | 81 |
| 10 History and | | | | | | | | |
| 11 Civil Government | 5 | 5 | 5 | 17 | 41 | 171 | 152 | 160 |
| 13 Elementary Science and | | | | | | | | |
| 14 Nature Study | 35 | 35 | 34 | 46 | 51 | 44 | 58 | 49 |
| 15 Physiology | 7 | 7 | 8 | 8 | 13 | 13 | 8 | 8 |
| 16 Physical Training | 52 | 49 | 50 | 49 | 42 | 37 | 37 | 37 |
| 17 Drawing | 75 | 85 | 88 | 82 | 86 | 92 | 78 | 77 |
| 18 Music | 67 | 71 | 68 | 68 | 67 | 67 | 64 | 64 |
| 19 Manual Training | 16 | 18 | 19 | 33 | 30 | 30 | 50 | 50 |
| Total Assignments | 1174 | 1250 | 1285 | 1401 | 1313 | 1404 | 1327 | 1245 |

THE AVERAGE PERCENTAGE OF RECITATION TIME GIVEN TO EACH SUBJECT IN EACH GRADE IN TEN AMERICAN CITIES

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 Opening Exercises | 3.6 | 3.4 | 3.4 | 3.5 | 2.9 | 2.9 | 2.9 | 2.9 |
| 2 Reading and Literature | 37.3 | 31.8 | 28.7 | 20.6 | 17 | 12.2 | 10.4 | 9.5 |
| 3 Writing | 6.7 | 6.1 | 7.1 | 5.9 | 4.5 | 4.5 | 2 | 1.6 |
| 4 Spelling | 3.9 | 7.1 | 6.3 | 5.5 | 4.9 | 4.6 | 3.2 | 2.4 |
| 5 Grammar | | | | | | | | |
| 6 Language and | | | | | | | | |
| 7 Composition | 10.9 | 10.1 | 10.1 | 10.1 | 10.2 | 16.5 | 18.6 | 18.8 |
| 8 Arithmetic | 13.6 | 15.4 | 18.2 | 18 | 17.6 | 18.3 | 17.7 | 17 |
| 9 Geography | .9 | 1.5 | 4.1 | 11.8 | 12 | 11.1 | 9.3 | 5.9 |
| 10 History, etc | .4 | .4 | .4 | 1.2 | 3 | 5.2 | 11.1 | 12 |
| 13 Elementary Science, etc | 2.9 | 2.8 | 2.6 | 3.4 | 3.7 | 3.2 | 4.2 | 3.6 |
| 15 Physiology | .5 | .6 | .6 | .6 | .9 | .9 | .6 | .6 |
| 16 Physical Training | 4.3 | 3.9 | 3.9 | 3.7 | 3 | 2.7 | 2.7 | 2.7 |
| 17 Drawing | 6.3 | 6.9 | 6.8 | 6.1 | 6.2 | 6.7 | 5.7 | 5.6 |
| 18 Music | 5.6 | 5.6 | 5.3 | 5.1 | 4.9 | 4.9 | 4.6 | 4.7 |
| 19 Manual Training | 1.3 | 1.4 | 1.4 | 2.5 | 2.1 | 2.2 | 3.6 | 8.6 |

## TABLE 47

THE CURRICULUM OF THE PUBLIC ELEMENTARY SCHOOLS OF NEW YORK CITY FOR THE YEARS 1868, 1888 AND 1904; ALSO THE PERCENTAGE OF TOTAL TIME DEVOTED TO EACH SUBJECT FOR THE YEARS 1888 AND 1904

| Grade | 1868 | | | | | | | 1888 | | | | | | | | | 1904 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Pct. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Pct. |
| 1 Opening Exercises Morals & Manners | x | x | x | x | | | | | | | | | | | | | | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 5.8 |
| 2 Reading | x | x | x | x | x | x | x | x | a | a | a | a | a | a | a | a | a | b | b | b | b | b | b | b | b | |
| 3 Writing | x | x | x | x | x | x | x | x | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 15.5 | 100 | 125 | 125 | 75 | 75 | 75 | | | 5.5 |
| 4 Spelling | x | x | x | x | x | x | x | x | a | a | a | a | a | a | a | a | a | b | b | b | b | b | b | b | b | |
| 5 Grammar | | | | | | x | x | x | 360 | 360 | 360 | 300 | 300 | 300 | 300 | 300 | 41.6 | b | b | b | b | b | b | b | b | |
| 6 Language | | | | | | | | | a | a | a | a | a | a | a | a | | 450 | 510 | 450 | 375 | 375 | 375 | 360 | 320 | 30.9 |
| 7 Composition | | | | | | | | x | a | a | a | a | a | a | a | a | | b | b | b | b | b | b | b | b | |
| 8 Arithmetic | x | x | x | x | x | x | x | x | 240 | 240 | 240 | 180 | 180 | 180 | 180 | 180 | 26.2 | 120 | 150 | 150 | 150 | 150 | 200 | 160 | 160 | 12 |
| 9 Geography | | | | x | x | x | x | x | | | 60 | 60 | 40 | 40 | | | 2.7 | | | | 135 | 120 | 120 | 80 | | 4.3 |
| 10 History | | | | | | | x | x | | | | 40 | 40 | 40 | 40 | | 2.5 | | | | | 90 | 120 | 120 | 120 | 4.3 |
| 11 Civics | | | | | | | | | | | | c | c | c | c | | | | | | | c | c | c | c | |
| 12 Object Lessons | x | x | x | x | x | x | x | | | | | | | | | | | | | | | | | | | |
| 13 Elementary Science | x | x | x | | | | | | | | | | | | | | | | | | | | | 80 | 80 | 1.5 |
| 14 Nature Study | | | | | | | | | | | | | | | | | | 90 | 90 | 90 | 75 | | | | | 4.2 |
| 16 Physiology & Hygiene, Physical Training | | | | | | | | | | | | | | | | | | 210 | 165 | 165 | 165 | 90 | 90 | 90 | 90 | 10 |
| 17 Drawing | | | | | | | | | 30 | 30 | 30 | 40 | 40 | 40 | 40 | 40 | 4.7 | 160 | 160 | 160 | 120 | 120 | 120 | 80 | 80 | 9.6 |
| 18 Music | | | | | | | | | 25 | 25 | 25 | 50 | 50 | 50 | 50 | 50 | 5.2 | 60 | 60 | 60 | 60 | 60 | 60 | | | 4.6 |
| 19 Manual Training, Cooking & Sewing | | | | | | | | | | | | | | | | | | | | | | | | 80 | 80 | 1.9 |
| 21 Punctuation | x | x | x | x | | | | | | | | | | | | | | 60 | 60 | 60 | 60 | 60 | 60 | | | 4.62 |
| 23 Foreign Language or Stenography | | | | | | | | | | | | | | | | | | | | | | | | | 200 | 1.9 |
| Total | | | | | | | | | 775 | 775 | 835 | 770 | 770 | 770 | 730 | 690 | | 1,315 | 1,395 | 1,335 | 1,305 | 1,290 | 1,295 | 1,225 | 1,265 | |

The presence of any letter in the above columns signifies that the subject was taught in that particular grade and year.

(a) Language in 1888 includes reading, spelling, and grammar. (b) Language in 1904 includes reading, spelling, memorizing, composition, and grammar. (c) In 1888 and 1904, history includes civics.

Table for the year 1868 compiled from Barnard's American Journal of Education, pp. 469–576; for 1888 from U. S. Commissioner's Report, 1888–89, Vol. I., pp. 369–411. Tables 20, 21, 22, 23, for years 1868 and 1888 are made from same sources.

## TABLE 48

THE CURRICULUM OF THE PUBLIC ELEMENTARY SCHOOLS OF ST. LOUIS FOR THE YEARS 1868, 1888 AND 1904; ALSO THE PERCENTAGE OF TOTAL TIME DEVOTED TO EACH SUBJECT FOR THE YEARS 1888 AND 1904

| | 1868 | | | | | | | 1888 | | | | | | | | | 1904 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GRADE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Pct. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Pct. |
| 1 Opening Exercises | | | | | | | | | | | | | | | | | | | | | | | | | |
| Morals and Manners | | | | | | | | | | 30 | 30 | 30 | 30 | | | .9 | 20 | 25 | 25 | 30 | 30 | 30 | 30 | 30 | 3.9 |
| 2 Reading | x | x | x | x | x | x | x | 650 | 660 | 350 | 300 | 300 | 300 | 180 | 180 | 25 | 400 | 250 | 125 | 150 | 120 | 120 | 90 | 90 | 16. |
| 3 Writing | | x | x | x | x | x | x | 100 | 125 | 125 | 120 | 120 | 120 | 90 | 90 | 7.1 | 100 | 125 | 125 | 125 | 125 | 120 | 90 | 90 | 12. |
| 4 Spelling | | | x | x | x | | | 200 | 100 | 150 | 150 | 150 | 150 | 150 | 150 | 10.3 | | 150 | 75 | 75 | 60 | 60 | 30 | 30 | 6.5 |
| 5 Grammar | | | | | | | x | | | | | | | 240 | 240 | 4.1 | | | | | | | | | |
| 6 Language | | | | | | | | 60 | 75 | 75 | 90 | 90 | 90 | | | | 40 | 50 | 75 | 60 | 60 | 60 | 90 | 120 | 7.6 |
| Declamation | | | | x | x | x | x | | | | | | | | | | | | | | | | | | |
| 8 Arithmetic | x | x | x | x | x | x | x | 200 | 250 | 300 | 600 | 300 | 300 | 300 | 300 | 19.3 | 100 | 125 | 150 | 150 | 150 | 150 | 150 | 150 | 15.2 |
| 9 Geography | | | | x | x | x | x | | | 150 | 180 | 180 | 180 | 180 | 180 | 8.9 | | | 100 | 120 | 120 | 120 | 120 | 120 | 9.5 |
| 10 History | | | | | | | x | | | 50 | 30 | 30 | 90 | 30 | 30 | 1.7 | | | | | | | 90 | 150 | 3.2 |
| 11 Civics | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 Elementary Science | | | | | | | | 20 | 30 | 50 | 60 | 60 | 60 | 30 | 30 | 2.9 | | | | | | | | | |
| 14 Nature Study | | | | | | | | | | | | | | | | | 20 | 25 | 25 | 30 | 30 | 30 | 30 | 30 | 3.1 |
| 16 Physical Training | x | x | x | x | x | x | x | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 4.3 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 5.4 |
| 17 Drawing | | | | | | | | 100 | 100 | 100 | 100 | 90 | 90 | 90 | 90 | 6.5 | 100 | 100 | 100 | 90 | 90 | 90 | 90 | 90 | 10. |
| 18 Singing | x | x | x | x | x | x | x | 70 | 65 | 75 | 80 | 80 | 80 | 80 | 80 | 5.2 | 15 | 25 | 25 | 30 | 30 | 30 | 30 | 30 | 3. |
| 23 German | | | | | | | | | | | | x | x | x | x | | | | | | | | | | |
| Total | | | | | | | | 1,450 | 1,445 | 1,505 | 1,790 | 1,480 | 1,540 | 1,420 | 1,420 | | 845 | 925 | 875 | 910 | 865 | 860 | 890 | 980 | |

TABLE 49

THE AVERAGE RECITATION TIME IN MINUTES PER WEEK DEVOTED TO EACH SUBJECT IN EACH GRADE (OR STANDARD) IN TEN CITIES OF ENGLAND

| Grade | I | II | III | IV | V | VI | VII | VIII | Pct. |
|---|---|---|---|---|---|---|---|---|---|
| 1 Scripture | 155 | 155 | 156 | 156 | 156 | 156 | 156 | 156 | 11.4 |
| 2 Reading | 210 | 206 | 181 | 154 | 140 | 127 | 108 | 76 | 11.1 |
| 3 Writing | 123 | 91 | 85 | 78 | 69 | 62 | 73 | 70 | 6 |
| 4 Spelling | 66 | 85 | 60 | 58 | 43 | 39 | 33 | 5 | 3.57 |
| 5 Grammar | 42 | 49 | 66 | 67 | 67 | 70 | 67 | 65 | 4.5 |
| 6 Recitation or Literature | 52 | 57 | 56 | 53 | 54 | 53 | 50 | 95 | 4.2 |
| 7 Composition | 43 | 52 | 61 | 54 | 85 | 99 | 72 | 25 | 4.5 |
| 8 Arithmetic | 267 | 266 | 276 | 308 | 294 | 293 | 257 | 231 | 20.1 |
| Algebra | 3 | 3 | 3 | 5 | 13 | 35 | 61 | 136 | 2.38 |
| 9 Geography | 53 | 64 | 80 | 91 | 87 | 88 | 70 | 97 | 5.7 |
| 10 History | 32 | 38 | 37 | 42 | 40 | 40 | 34 | 58 | 2.9 |
| 12 Object Lessons | | | | | | | | | |
| 13 Elementary Science | | | | | | | | | |
| 14 Nature Study | 62 | 61 | 55 | 44 | 40 | 41 | 46 | 92 | 4 |
| 16 Physical Training | 48 | 49 | 52 | 42 | 46 | 43 | 29 | 30 | 3.1 |
| 17 Drawing | 115 | 125 | 125 | 127 | 127 | 130 | 121 | 95 | 8.8 |
| 18 Singing | 64 | 64 | 64 | 64 | 67 | 67 | 65 | 70 | 4.8 |
| 19 Wood-work | 8 | 16 | 19 | 18 | 50 | 61 | 71 | | 2.1 |
| 20 Needle-work | (103) | (103) | (106) | (106) | (107) | (106) | (126) | (157) | (8.3) |
| 21 Cooking | (14) | (14) | (14) | (12) | (12) | (12) | (12) | | ( .8) |
| 22 French | 4 | 4 | 2 | 2 | 2 | 29 | 36 | 47 | 1.1 |
| Total | 1,347 | 1,369 | 1,361 | 1,359 | 1,380 | 1,433 | 1,359 | 1,338 | |

THE AVERAGE PERCENTAGE OF RECITATION TIME GIVEN TO EACH SUBJECT IN EACH GRADE IN TEN CITIES OF ENGLAND

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 Scripture | 11.5 | 11.3 | 11.5 | 11.5 | 11.3 | 10.9 | 11.5 | 11.7 | |
| 2 Reading | 15.6 | 15.1 | 13.3 | 11.3 | 10.2 | 8.9 | 7.9 | 5.7 | |
| 3 Writing | 8.9 | 6.7 | 6.3 | 5.8 | 4.9 | 4.4 | 5.4 | 5.2 | |
| 4 Spelling | 4.9 | 6.2 | 4.4 | 4.3 | 3.1 | 2.7 | 2.4 | .4 | |
| 5 Grammar | 3.1 | 3.6 | 4.9 | 4.9 | 4.9 | 4.9 | 4.9 | 4.9 | |
| 6 Recitation or Literature | 3.9 | 3.7 | 3.7 | 3.9 | 3.9 | 3.7 | 3.7 | 7.1 | |
| 7 Composition | 3.2 | 3.8 | 4.5 | 3.9 | 6.2 | 6.9 | 5.3 | 1.9 | |
| 8 Arithmetic | 19.8 | 19.4 | 19.9 | 22.7 | 21.3 | 20.5 | 18.9 | 16.5 | |
| Algebra | .2 | .2 | 1.2 | .4 | .9 | 2.5 | 4.5 | 10.2 | |
| 9 Geography | 3.9 | 4.7 | 5.9 | 6.7 | 6.3 | 6.2 | 5.2 | 9.3 | |
| 10 History | 2.4 | 2.8 | 2.7 | 3.1 | 3.9 | 2.8 | 3.4 | 6.9 | |
| 13 Elementary Science, etc. | 4.6 | 4.5 | 4.1 | 3.3 | 3.9 | 2.8 | 3.4 | 6.9 | |
| 16 Physical Training | 3.6 | 3.6 | 3.8 | 3.1 | 3.4 | 3 | 2.2 | 2.9 | |
| 17 Drawing | 8.5 | 9.1 | 9.2 | 9.4 | 9.2 | 9.1 | 8.9 | 7.1 | |
| 18 Singing | 4.8 | 4.6 | 4.7 | 4.7 | 4.9 | 4.7 | 4.8 | 5.2 | |
| 19 Wood-work | .6 | 1.2 | .9 | .9 | 3.6 | 4.3 | 5.2 | | |
| 20 Needle-work | (7.7) | (7.5) | (7.8) | (7.8) | (7.8) | (7.4) | (9.3) | (10) | |
| 21 Cooking | (1.1) | ( .9) | (1.1) | ( .9) | ( .9) | ( .9) | ( .9) | | |
| 22 French | .3 | .3 | .1 | .1 | .1 | 1.9 | 2.7 | 3.5 | |

TABLE 50

THE PERCENTAGE OF TOTAL TIME GIVEN TO EACH SUBJECT IN TEN CITIES OF ENGLAND

| SUBJECTS | London | Manchester | West Ham. | Bolton | Norwich | Carlisle | West Hartlepool | Newcastle | Wellingborough | Castleford | Average Pct. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Scripture | 11.8 | 18.9 | 12.1 | 13.2 | 10.5 | 2.5 | 11.7 | 12 | 13.1 | 4.9 | 11.1 |
| 2 Reading | 11.4 | 11 | 12.4 | 12.9 | 9.5 | 13.1 | 10.7 | 11.9 | 7.8 | 17.4 | 11.1 |
| 3 Writing | 6 | 5.9 | 3.1 | 10.1 | 3.6 | 5.6 | 6.6 | 10.6 | 2.3 | 4 | 6 |
| 4 Spelling | 1.3 | 3.1 | 2.1 | | 6.2 | 6.5 | | 3.3 | 2.3 | 6.9 | 3.5 |
| 5 Grammar | 5.5 | 5.9 | 2.5 | 5.2 | 4.1 | 5.3 | | 7.3 | 3.1 | 4 | 4.5 |
| 6 Recitation, Literature | 3.3 | 2.5 | 2.7 | 3 | 2.5 | 5.4 | 9.4 | 2.7 | 4.5 | 3 | 4.2 |
| 7 Composition | 4 | 2.6 | 2 | 1.7 | 14.3 | 7.1 | | 4.6 | 5.8 | 4.8 | 4.5 |
| 8 Arithmetic | 15.8 | 16.6 | 24 | 16.8 | 15 | 23.9 | 26 3 | 18.5 | 14.8 | 22.7 | 20.1 |
| Algebra | 3.1 | 2.7 | .7 | 1.1 | | | 3.5 | | | | 2.3 |
| 9 Geography | 6.3 | 6.6 | 4.5 | 5.4 | 5.1 | 5.7 | | 6.4 | 8 | 7 | 5.9 |
| 10 History | 4.4 | | 2.8 | 1.2 | 2.9 | 4.8 | 4.2 | | 5.5 | 2 | 2.9 |
| 12 Object Lessons | 4.3 | 2.8 | | | 2.6 | | | 4.3 | 3.4 | in. st'y | ~ |
| 13 Elementary Science | | | 2.4 | 3.6 | | | 0.6 | | | 4 | 4 |
| 16 Physical Training | 4 | 4.5 | 2.4 | 4 | 2.3 | 5.4 | | 4.1 | 4.5 | 4 | 3.1 |
| 17 Drawing | 9.6 | 7.9 | 7 | 8 | 9 | 9 | 11.3 | 8.2 | 11.9 | 10 | 8.8 |
| 18 Singing | 4 | 4.5 | 4.8 | 3.4 | 4 | 5.4 | 6.6 | 6.2 | 3.8 | 4.9 | 4.8 |
| 19 Wood-work | 2.4 | 3 | | 1.2 | 4.6 | | | | 3.1 | | 2.1 |
| 20 Needle-work | (5.4) | (8 ) | (11.4) | (8.7) | | | (22.6) | | (11.9) | (10.7) | (8.3) |
| 21 Cooking | | | | | | | | | | 5.4 | .8 |
| 22 French | 2.3 | | | | | | | | | | |
| Examination of Home Work | | | | | 3.2 | | | | | | |
| Varied Occupations | | | 2.3 | | | | | | | | |
| Domestic Economy | | | 3.3 | | | | | | | | |

TABLE 51

THE AVERAGE RECITATION TIME IN MINUTES PER WEEK GIVEN TO EACH SUBJECT IN EACH GRADE IN THE TEN GERMAN CITIES

| Grade | I | II | III | IV | V | VI | VII | VIII |
|---|---|---|---|---|---|---|---|---|
| 1 Religion | 172 | 199 | 207 | 234 | 246 | 246 | 234 | 218 |
| 6 Language [1] | 588 | 603 | 600 | 567 | 513 | 501 | 583 | 472 |
| 8 Arithmetic | 252 | 282 | 282 | 282 | 270 | 270 | 270 | 255 |
| 9 Geography | 58 | 47 | 113 | 115 | 111 | 111 | 134 | 147 |
| 10 History | | | 33 | 60 | 103 | 103 | 110 | 120 |
| 14 Nature Study | | | 80 | 66 | 100 | 140 | 126 | 111 |
| 16 Gymnastics | 54 | 36 | 60 | 108 | 132 | 132 | 132 | 125 |
| 17 Drawing | 12 | 42 | 54 | 60 | 120 | 114 | 137 | 128 |
| 18 Singing | 54 | 54 | 93 | 99 | 93 | 93 | 99 | 90 |
| 20 Handwork | (96) | (132) | (222) | (234) | (258) | (246) | (258) | (278) |
| Geometry | | | | 18 | 42 | 72 | 102 | 112 |
| Total | 1,190 | 1,263 | 1,502 | 1,609 | 1,730 | 1,782 | 1,822 | 1,788 |

SHOWING THE AVERAGE PERCENTAGE OF RECITATION TIME GIVEN TO EACH SUBJECT IN EACH GRADE IN TEN GERMAN CITIES

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 Religion | 14.5 | 15.8 | 13.8 | 14.6 | 14.2 | 13.8 | 13 | 12.3 |
| 6 Language | 49.4 | 47.8 | 40 | 35.3 | 29.7 | 28.2 | 26.5 | 26.5 |
| 8 Arithmetic | 21.2 | 22.3 | 18.7 | 17.6 | 15.6 | 15.2 | 15.2 | 15.3 |
| 9 Geography | 4.9 | 3.7 | 7.5 | 7.2 | 6.4 | 6.3 | 7.4 | 8.3 |
| 10 History | | | 2.2 | 3.8 | 6 | 5.8 | 6 | 6.8 |
| 14 Nature Study | | | 5.3 | 4 | 5.8 | 7.9 | 7 | 6.2 |
| 16 Gymnastics | 4.6 | 2.8 | 4 | 6.7 | 7.6 | 7.4 | 7.3 | 7.6 |
| 17 Drawing | 1 | 3.3 | 3.6 | 3.8 | 7 | 6.4 | 7.3 | 7.2 |
| 18 Singing | 4.6 | 4.3 | 6.2 | 6.2 | 5.4 | 5.2 | 5.4 | 5 |
| 20 Handwork | (7.3) | (9.3) | (13.6) | (13.5) | (14.2) | (13.4) | (14) | (13.5) |
| Geometry | | | | 1 | 2.4 | 4.1 | 5.6 | 6.5 |

[1] Language includes reading, writing, spelling, literature and composition.

TABLE 52

THE PERCENTAGE OF TOTAL TIME GIVEN TO EACH SUBJECT IN TEN GERMAN CITIES

| | Berlin | Königsburg | Gottingen | Wiesbaden | Dresden | Munich | Würtzburg | Stuttgart | Karlsruhe | Hamburg | Average Pct. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Religion | 13.3 | 14.7 | 13.4 | 13.8 | 13.9 | 9.7 | 20 | 18.6 | 11 | 7.5 | 14 |
| 6 Language[1] | 28.8 | 32.1 | 33.6 | 39 | 31.4 | 38.5 | 34.8 | 37 | 37.6 | 30 | 34.2 |
| 8 Arithmetic | 14.6 | 14.7 | 14.7 | 15.3 | 16.3 | 22.8 | 20 | 17 | 19.7 | 15.5 | 17.2 |
| 9 Geography | 4.5 | 5.5 | 5.1 | 9.8 | 14.6 | 3.8 | 6.7 | 13.6[2] | 5 | 5 | 6.6 |
| 10 History | 4.5 | 5.5 | 4.7 | 3.9 | 4.7 | 3.8 | 2.6 | | 2.3 | 4.6 | 4.2 |
| 12 Object Lessons | | | 4.3 | | | 5.4 | | | | | |
| 14 Nature Study | 9.6 | 5.5 | 4.5 | 3.9 | | | 4.1 | | 3.6 | 8.3 | 5 |
| 16 Gymnastics | 7.3 | 5.5 | 8.6 | 3.9 | 5.9 | 7.5 | 4.7 | 4.6 | 5 | 6.1 | 6.2 |
| 17 Drawing | 6 | 6 | 5.6 | 1.8 | 5.6 | 5.4 | 3.5 | 3.7 | 6.4 | 6.6 | 5.2 |
| 18 Singing | 6.4 | 6.8 | 6 | 5.4 | 4.9 | 3.8 | 4.1 | 4.4 | 6.4 | 6.1 | 5.3 |
| 20 Hand-work for Girls | ( 8 ) | (11 ) | (11.4) | (10.6) | (13.3) | (11 ) | (10.5) | (12 ) | (16 ) | (18.2) | (13 |
| Geometry | 4 | 3.6 | 2.6 | 2.4 | 2.9 | | | | 2.7 | 3.4 | 2.7 |
| English | | | | | | | | | | 7.5 | |

[1] Language includes reading, writing, spelling, grammar and composition.
[2] Includes history, object lessons and nature study.

An interesting comparison with Dr. Payne's data is made possible by the figures published in the report of the commission appointed to study the system of Education in the Public Schools of Baltimore.[1] These results from the larger cities of the country showing a wide variability are representative of the prevailing practice in city school systems of smaller size as well.

"The following table shows the percentage of school time allotted in the suggested schedules to the subjects that are generally called the essentials, namely, English, including reading, writing, spelling, and language; arithmetic, geography, and history, which are here designated as the 'old' subjects. Similar allotments in certain other subjects are also shown, which are here designated as 'new' subjects, such as drawing, manual training, etc."

TABLE 53

PERCENTAGE OF SCHOOL TIME DEVOTED TO OLD SUBJECTS AND NEW SUBJECTS

| CITIES | Old Subjects | New Subjects | CITIES | Old Subjects | New Subjects |
|---|---|---|---|---|---|
| New York..... | 62.48 | 37.52 | Baltimore..... | 77.90 | 22.10 |
| Chicago..... | 52.60 | 47.40 | Pittsburg..... | 81.00 | 19.00 |
| Philadelphia.... | 67.60 | 32.40 | Detroit..... | 83.80 | 16.20 |
| St. Louis..... | 70.87 | 29.13 | San Francisco.. | 79.90 | 20.10 |
| Boston..... | 73.36 | 26.64 | Milwaukee..... | 75.45 | 24.55 |
| Cleveland..... | 79.55 | 20.45 | Cincinnati..... | 76.69 | 23.31 |

[1] U. S. Bureau of Education, Bulletin No. 4. 1911.

## TABLE 54

THE MINUTES PER WEEK DEVOTED TO THE STUDY OF ARITHMETIC AND ALGEBRA IN CERTAIN CITIES (1911)

| CITIES | YEAR | | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | First | Second | Third | Fourth | Fifth | Sixth | Seventh | Eighth | |
| New York. . . | 125 | 150 | 150 | 150 | 150 | 200 | 200 | 200 | 1,325 |
| Chicago. . . . . | | 150 | 200 | 250 | 150 | 150 | 150 | 150 | 1,200 |
| Philadelphia. | 150 | 200 | 200 | 200 | 225 | 225 | 225 | 225 | 1,650 |
| St. Louis. . . . | 100 | 125 | 150 | 150 | 150 | 150 | 150 | 150 | 1,125 |
| Boston. . . . . | 25 | 210 | 210 | 270 | 270 | 230 | 210 | 210 | 1,635 |
| Cleveland . . . | 60 | 200 | 250 | 250 | 250 | 250 | 300 | 300 | 1,860 |
| Baltimore . . | 250 | 200 | 200 | 200 | 250 | 250 | 275 | 275 | 1,900 |
| Pittsburg . . . | 60 | 120 | 180 | 200 | 200 | 240 | 300 | 360 | 1,660 |
| Detroit . . . . . | 75 | 150 | 200 | 225 | 250 | 250 | 275 | 275 | 1,775 |
| San Francisco | 150 | 150 | 150 | 200 | 250 | 250 | 250 | 250 | 1,650 |
| Milwaukee . . | 75 | 100 | 150 | 175 | 175 | 200 | 200 | 212 | 1,287 |
| Cincinnati. . . | 150 | 250 | 240 | 240 | 240 | 300 | 300 | 360 | 2,080 |

## TABLE 55

THE PERCENTAGE OF SCHOOL TIME EXCLUSIVE OF RECESSES AND OPENING EXERCISES DEVOTED TO THE STUDY OF ARITHMETIC AND ALGEBRA IN THE GRADES, IN 1890 AND IN 1910–11, IN CERTAIN CITIES

| CITIES | YEAR | | CITIES | YEAR | |
|---|---|---|---|---|---|
| | 1890 | 1910–11 | | 1890 | 1910–11 |
| New York. . . . . | 26.2 | 13.4 | Detroit . . . . . | 17.2 | 16.0 |
| Chicago. . . . . | 9.3 | 10.0 | Buffalo . . . . . | | |
| Philadelphia. . . . . | | 16.1 | San Francisco . . . . | 14.0 | 16.6 |
| St. Louis. . . . . | 19.3 | 15.0 | Milwaukee. . . . . | 15.5 | 14.7 |
| Boston. . . . . | 16.6 | 15.5 | Cincinnati . . . . . | 13.4 | 18.8 |
| Cleveland . . . . . | 14.1 | 15.5 | | | |
| Baltimore . . . . . | 19.5 | 18.3 | Average . . . . . | 16.5 | 15.8 |
| Pittsburg. . . . . | | 18.0 | | | |

## TABLE 56

THE YEAR OF THE COURSE IN WHICH SPECIFIED TOPICS IN ARITHMETIC ARE TREATED IN THE CERTAIN CITIES

| CITIES | 45 Combinations Learned | Multiplication Tables Learned | Long Division Taught | Addition and Subtraction of Fractions Taught | Multiplication and Division of Fractions Taught | Decimals Taught | Percentage Taught |
|---|---|---|---|---|---|---|---|
| New York | 2 | 3 | 3 | 4 | 5 | 5 | 6 |
| Chicago | 2 | 4 | 4 | 5 | 5 | 6 | 6 |
| Philadelphia | 2 | 2 | 3 | 5 | 5 | 6 | 6 |
| St. Louis | 2 | 3 | 4 | 3 | 4 | 4 | 5 |
| Boston | 2 | 4 | 4 | 5 | 6 | 5 | 6 |
| Cleveland | 2 | 4 | 4 | 5 | 6 | 5 | 6 |
| Baltimore | 2 | 3 | 4 | 3 | 4 | 4 | 6 |
| Pittsburg | 2 | 3 | 4 | 4 | 5 | 5 | 6 |
| Detroit | 2 | 3 | 4 | 4 | 5 | 5 | 6 |
| Buffalo | 2 | 3 | 4 | 5 | 5 | 5 | 6 |
| San Francisco | 2 | 3 | 4 | 4 | 5 | 4 | 6 |
| Milwaukee | 4 | 4 | 4 | 5 | 5 | 6 | 7 |
| Cincinnati | 2 | 3 | 3 | 4 | 5 | 4 | 6 |

## TABLE 57

THE PERCENTAGE OF THE SCHOOL TIME, EXCLUSIVE OF OPENING EXERCISES AND RECESSES, DEVOTED TO THE STUDY OF GEOGRAPHY IN VARIOUS CITIES IN 1890 AND IN 1910–11

| CITIES | 1890 | 1910–11 | CITIES | 1890 | 1910–11 |
|---|---|---|---|---|---|
| New York | 2.7 | 6.2 | Detroit | 8.6 | 8.2 |
| Chicago | 4.9 | 4.4 | Buffalo | [1] | |
| Philadelphia | | 7.0 | San Francisco | 8.9 | 7.5 |
| St. Louis | 8.9 | 7.3 | Milwaukee | 6.0 | 6.7 |
| Boston | 6.8 | 6.2 | Cincinnati | 6.5 | 6.1 |
| Cleveland | 6.9 | 7.2 | | | |
| Baltimore | 6.3 | 11.0 | Average | 6.55 | 7.23 |
| Pittsburg | | 9.0 | | | |

[1] No data at hand.

TABLE 58

THE PERCENTAGE OF TIME DEVOTED TO MANUAL TRAINING IN CERTAIN CITIES IN 1910–11

| CITY | PERCENTAGE | CITY | PERCENTAGE |
|---|---|---|---|
| New York | 4.7 | Pittsburg | 5 |
| Chicago | 9.9 | Detroit | 1.4 |
| Philadelphia | 3.5 | Buffalo | [1] |
| St. Louis | 2.4 | San Francisco | 1.8 |
| Boston | 6.2 | Milwaukee | 6.2 |
| Cleveland | 4.8 | Cincinnati | 2.2 |
| Baltimore | 5.3 | | |

Doubtless the variation found in the time allotted to the various subjects is due in some degree to a corresponding difference in emphasis upon the subject in question, *i. e.* a difference in the product expected. There is no doubt but that a single school system with a reputation for good work influences many others. Much must be allowed for tradition and something for a passing demand which leads now and again to additional emphasis on this or that subject.

A scientific allotment of time and organization of the course of study will be possible only when we define more accurately the ends which we desire and perfect the scales or units of measurement which we apply in measuring results in education. We will concern ourselves with certain optima the resultants of time devoted to the given subject and the product secured. The optimum in a subject like arithmetic or handwriting will be thought of in terms of three variables, the amount and distribution of time, the product in terms of accuracy or form, and the speed with which the given result is achieved. If we can determine that a certain standard of form is desirable in penmanship and that the pupil must be able to produce these forms at a certain speed, we can then experiment with the amount and distri-

[1] No data at hand.

bution of time with a definite goal in view. When such experiments are undertaken, it will be necessary to allow for individual differences. Possibly our standards may be expressed in terms of the accomplishment of the median individual and in terms of the variability from this central tendency.

## § 15. Size of School as a Conditioning Factor in Secondary Education [1]

The most typical, in the sense of the most frequent, secondary school in the United States is a school taught by one teacher. The secondary schools in the country with only one teacher outnumber by a considerable figure all those with five or more teachers. Those with only one or two teachers outnumber by a considerable figure all the rest. Those with one, two, or three teachers are ten times as frequent as those with ten or more teachers and five times as frequent as those with from five up to ten teachers.

Of course the fact that the one-teacher school is much the most frequent does not mean that a secondary school student will most frequently attend a one-teacher school. The typical secondary school education in the sense of the sort of secondary education most commonly given need not be that given in a one-teacher school. Still the frequency of the schools of small teaching force is so much greater that in spite of the large registration of city high schools there are more pupils in the two-teacher high schools than in any other one group, unless, perhaps, the three-teacher schools, and more in schools with three teachers or less than in schools of from five to thirteen teachers, and nearly if not quite as many as in schools of fifteen or more teachers.

The printed discussions of secondary school problems seem to have in view to a large degree a school of six to twelve teachers with two or three hundred pupils. The report of the Committee of Ten strikes one as unconsciously based upon the acceptance of some such quantity as typical for secondary schools. It is

[1] This section is quoted with slight alterations from an article entitled "A Neglected Aspect of the American High School," by Edward L. Thorndike, which appeared in the *Educational Review* in March, 1907 (Vol. XXXIII, No. 3).

nowhere typical in any valuable sense, and is about as little typical as could be expected in Massachusetts. Schools of one or two teachers only are six times as frequent and enroll more pupils. Schools of twenty teachers or more enroll as many pupils. Either the district high school, as we may call the one- or two-teacher school, or the unlimited possibility high school, as we may call one that commands the services of twenty or more teachers, is a more important educational agency in this country than the six- to twelve-teacher high school.

The facts concerning the size of teaching staff and the size of student body, and consequently the opportunity for a varied program of studies, advanced instruction, periods of a half-hour's length, specialized equipment on the part of teachers and the like, are shown in Table 59 and Figure 22, which give the frequencies of different sizes of teaching staff for the country as a whole; and in Table 60 and Figure 23, which give roughly the frequencies of different sizes of student body.

These facts show that the high school is, like the "college," an institution of enormous variability as regards its capacity for educational work and its administrative and educational arrangements.

This variability has never been fully realized in the discussions of secondary school problems. The recommendations made are often utterly impossible of realization by the village high school and decidedly unwise for the unlimited possibility high school. The rule must in the nature of the case be that what is best for any one-fifth of high school effort is not the best for any other fifth. Because of historical reasons the village high schools and the schools of unlimited possibility have suffered most.

The one- or two-teacher high school has been confined to textbooks made for class instruction in periods of thirty minutes or more. It has been led to attempt to teach chiefly foreign languages and mathematics, the subjects where close grading and

FIG. 22. Relative frequencies of public high schools of 1, 2, 3, 4, etc. teachers (1904.)

TABLE 59

| Number of Teachers | Number of Public High Schools (1904) | | | | | | | Number of Teachers |
|---|---|---|---|---|---|---|---|---|
| | North Atlantic States | South Atlantic States | South Central States | North Central States | Western States | District of Columbia | Entire United States | |
| 1 | 322 | 200 | 245 | 1,320 | 88 | .. | 2,175 | 1 |
| 2 | 392 | 138 | 227 | 968 | 82 | .. | 1,807 | 2 |
| 3 | 251 | 69 | 148 | 662 | 91 | .. | 1,221 | 3 |
| 4 | 185 | 41 | 66 | 306 | 42 | .. | 640 | 4 |
| 5 | 106 | 19 | 30 | 190 | 36 | .. | 380 | 5 |
| 6 | 78 | 4 | 9 | 98 | 18 | .. | 207 | 6 |
| 7 | 61 | 7 | 14 | 80 | 10 | .. | 172 | 7 |
| 8 | 28 | 5 | 2 | 44 | 8 | .. | 87 | 8 |
| 9 | 26 | 5 | 6 | 31 | 6 | .. | 74 | 9 |
| 10 | 14 | 3 | 2 | 24 | 5 | .. | 48 | 10 |
| 11 | 12 | .. | 2 | 25 | 3 | .. | 42 | 11 |
| 12 | 15 | .. | 4 | 17 | 2 | .. | 38 | 12 |
| 13 | 9 | 2 | 3 | 13 | 3 | .. | 30 | 13 |
| 14 | 17 | .. | 2 | 12 | 4 | .. | 35 | 14 |
| 15 | 10 | .. | 1 | 6 | 3 | .. | 20 | 15 |
| 16 | 11 | 2 | .. | 2 | 2 | 1 | 18 | 16 |
| 17 | 6 | .. | 2 | 4 | 2 | .. | 14 | 17 |
| 18 | 11 | 1 | 1 | 6 | 3 | 1 | 23 | 18 |
| 19 | 6 | .. | .. | 2 | 2 | 1 | 11 | 19 |
| 20 | 7 | .. | .. | 5 | .. | .. | 12 | 20 |
| 21 | 5 | 1 | .. | 6 | 2 | .. | 14 | 21 |
| 22 | 5 | 1 | .. | 4 | 1 | .. | 11 | 22 |
| 23 | 6 | .. | .. | 5 | .. | .. | 11 | 23 |
| 24 | 8 | 1 | 1 | 4 | 4 | .. | 17 | 24 |
| 25 | 5 | .. | .. | 4 | .. | 1 | 10 | 25 |
| 26 | 3 | 1 | 1 | 1 | 1 | .. | 7 | 26 |
| 27 | 2 | .. | .. | 4 | .. | .. | 6 | 27 |
| 28 | 2 | .. | .. | 1 | .. | .. | 5 | 28 |
| 29 | 2 | .. | .. | 1 | 1 | .. | 4 | 29 |
| 30 | .. | .. | .. | 3 | 2 | .. | 5 | 30 |
| 31 | .. | .. | .. | 1 | .. | .. | 1 | 31 |
| 32 | 4 | .. | .. | 1 | .. | 1 | 6 | 32 |
| 33 | .. | .. | .. | .. | .. | 1 | 1 | 33 |
| 34 | 2 | .. | .. | .. | 1 | .. | 3 | 34 |
| 35 | 1 | .. | .. | 2 | .. | .. | 3 | 35 |
| 36 | 1 | .. | .. | 2 | .. | .. | 3 | 36 |
| 37 | 3 | .. | .. | 2 | .. | .. | 5 | 37 |
| 38 | .. | .. | .. | 4 | .. | .. | 4 | 38 |
| 39 | .. | .. | .. | .. | .. | .. | .. | 39 |
| 40 | 1 | .. | .. | .. | .. | .. | 1 | 40 |
| | Also seventeen schools of over 40 teachers<br>41– 50 5<br>51– 60 4<br>61– 70 2<br>71– 80 3<br>81– 90 1<br>91–100 0<br>101–109 2 | | | Also eight schools of over 40 teachers<br>41–50 2<br>51–60 3<br>61–70 2<br>71–80 0<br>81–90 1 | Also one each of 43 and 51 teachers | Also one of 45 teachers | Also twenty-eight over 40 teachers | |

recitation methods are most necessary. It has been stigmatized for failure to maintain a four-year course or the pretense of one. The first two results are almost certainly unfortunate and the third is probably so. Text-books somewhat after the pattern used by the best correspondence schools would be much more efficient. By replacing four classes in Latin receiving only fifteen

TABLE 60

SHOWING THE APPROXIMATE PROPORTIONS OF THE PUBLIC HIGH SCHOOL ENROLLMENT OF THE UNITED STATES IN SCHOOLS OF FROM 1 TO 110 TEACHERS (1904)

| | Number of Teachers | | Students Enrolled | | | |
|---|---|---|---|---|---|---|
| In schools of | 1– 3 | teachers are | 36.6 | per cent of | the public high school | students |
| " | 4– 6 | " | 22.1 | " | " | " |
| " | 7– 10 | " | 9.1 | " | " | " |
| " | 1– 10 | " | 68.6 | " | " | " |
| " | 11– 20 | " | 13.5 | " | " | " |
| " | 21– 30 | " | 7.7 | " | " | " |
| " | 31– 40 | " | 3.6 | " | " | " |
| " | 41– 50 | " | 2.0 | " | " | " |
| " | 51– 60 | " | 1.2 | " | " | " |
| " | 61– 70 | " | 1.0 | " | " | " |
| " | 71– 80 | " | .8 | " | " | " |
| " | 81– 90 | " | .7 | " | " | " |
| " | 91–100 | " | .0 | " | " | " |
| " | 101–110 | " | .8 | " | " | " |

minutes a day each by one class in English enrolling pupils of all four years and doing different work each year of a quadrennium, the teacher would have a class of size sufficient to arouse enthusiasm and mutual interests in the students, taught for a full forty-minute period daily, and still have twenty minutes daily to apply to the strengthening of other courses. The same result would be reached by making a quadrennium course in science, say biology, physics, chemistry, and agriculture.

To teach a four-year course poorly may for certain social reasons have advantages over teaching a two-year course twice as well, but in ultimate educational value it cannot be as good in the case of a one- or two-teacher high school. Pupils who are able to give the last two years to continued secondary education ought to be encouraged to go to a larger high school. It is not economical to try to fit the enormous variability of local educational endeavor to a scale so coarse as "elementary school,"

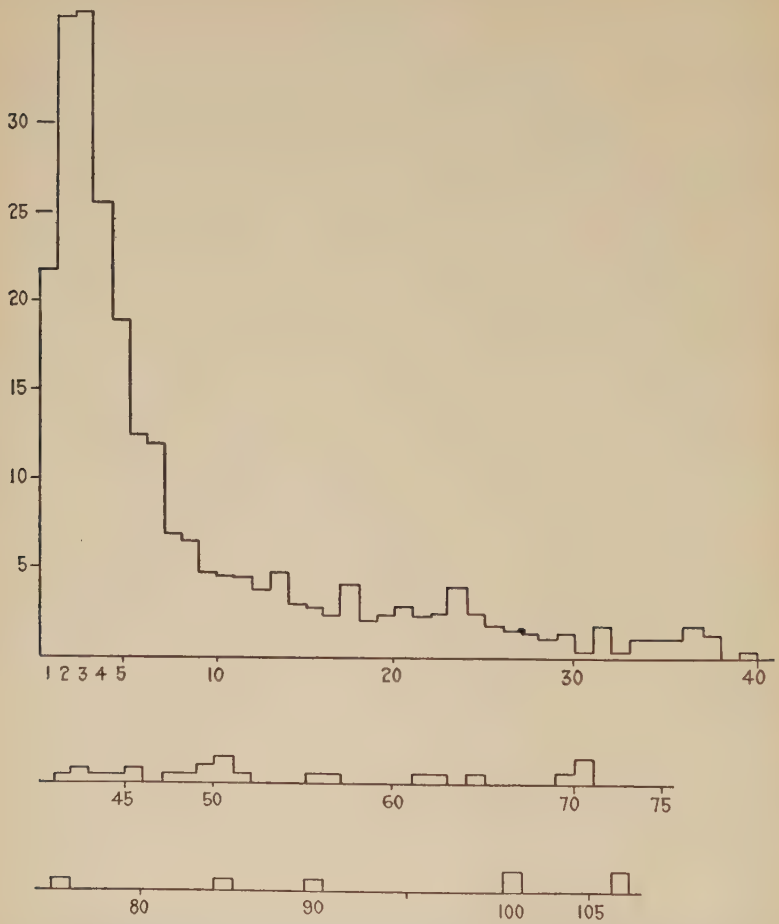



FIG. 23. The horizontal line is for the size of school (number of teachers): the heights give the approximate number of pupils enrolled, as measured by the number of thousands of teachers employed (1904).

"elementary school and high school," and "elementary school, high school, and college." We need two-year high schools as truly as four-year high schools. And we lower, not raise, edu-

cational standards by providing a four-year course for a high school with only one teacher to do its work.

An easy, but perhaps the wrong, solution for the village high school problem will rise in every one's mind—consolidation. The difficulties of consolidation are here of course far greater than in elementary schools. And consolidation theoretically should result not only in replacing one- and two-teacher high schools by four- or six-teacher schools, but also in replacing *no* high school by one- and two-teacher schools, giving us the same problem again. Into the details of this problem I shall not enter, as this article is intended to show the significance of statistics rather than to contribute to theories of administration. I venture, however, to correct one opinion which is demonstrably unjust to the village high schools, the opinion that they are the result of relatively low educational ideals.

The predominance of small over large high schools is by no means symptomatic of poor support of secondary education by a community. This fact is shown by Table 61, which gives the states ranked in order for the smallness of the proportion of secondary students enrolled in schools with only one, two or three teachers; and for the general support of secondary education as measured by the number of public high-school teachers per thousand of population. For example, Rhode Island, New Jersey and New York, though very free from the one- two- three-teacher high school, are near mediocrity in respect to degree of support, while Maine, Nebraska and South Dakota, though characterized by many small high schools, rank very high in degree of support of secondary education. Some of the states that are in the top fifth for the number of public high school teachers provided for one thousand of the population are distinctly village high school states. Nor do those states, such as California, Minnesota, and Wisconsin, which, though rural states, are exceptional in the low percentage of one- and two-teacher high schools, provide any bet-

TABLE 61

THE STATES RANKED IN ORDER BY THE SMALLNESS OF THE PROPORTION OF SECONDARY STUDENTS ENROLLED IN SCHOOLS WITH ONE, TWO OR THREE TEACHERS (COLUMN HEADED "SIZE OF SCHOOLS") AND BY THE NUMBER OF PUBLIC HIGH SCHOOL TEACHERS PER THOUSAND OF POPULATION (COLUMN HEADED "SUPPORT OF SCHOOLS"). DATA FOR 1904

| | Size of Schools | Support of Schools | | Size of Schools | Support of Schools |
|---|---|---|---|---|---|
| Rhode Island | 1 | 21 | Missouri | 26 | 26 |
| Massachusetts | 2 | 1 | Idaho | 27 | 31 |
| New Jersey | 3 | 25 | Ohio | 28 | 10 |
| New York | 4 | 20 | Indiana | 29 | 5 |
| Utah | 5 | 31 | W. Virginia | 30 | 40 |
| Colorado | 6 | 3 | Vermont | 31 | 9 |
| California | 7 | 17½ | No. Dakota | 32 | 23 |
| Connecticut | 8 | 15½ | Kansas | 33 | 12 |
| New Mexico [1] | 9 | 36½ | Arkansas | 34 | 45 |
| Illinois | 10 | 22 | Maine | 35 | 4 |
| Minnesota | 11 | 19 | Texas | 36 | 29 |
| Wisconsin | 12 | 15½ | So. Carolina | 37 | 36½ |
| Montana | 13 | 13½ | Mississippi | 38 | 38½ |
| New Hampshire | 14 | 11 | Nebraska | 39 | 2 |
| Maryland | 15 | 34 | Georgia | 40 | 38½ |
| Michigan | 16 | 8 | Oregon | 41 | 24 |
| Oklahoma | 17 | 34 | Wyoming | 42 | 28 |
| Washington | 18 | 6½ | Florida | 43 | 34 |
| Delaware | 19 | 27 | Tennessee | 44 | 42 |
| Iowa | 20 | 6½ | Alabama | 45 | 45 |
| Kentucky | 21 | 42 | So. Dakota | 46 | 13½ |
| Pennsylvania | 22 | 31 | Nevada | 47 | 17½ |
| Virginia | 23 | 45 | | | |
| Louisiana | 24 | 42 | | | |
| No. Carolina | 25 | 47 | | | |

ter for secondary education than their neighbors Washington, Michigan, Indiana, and South Dakota, which have high percentages. The large cities often, perhaps usually, do not provide for secondary education so well as do the towns. For instance, San Francisco, Chicago, Philadelpha, and New York do not provide anywhere nearly so many public high school teachers per thou-

[1] Including Arizona also.

sand of population as their respective states do. A two-teacher high school in a town of two thousand may seem to the modern educator a rather despicable educational institution, but it means a provision for secondary education far, far above the average of any state and still farther above the average of all save a very few cities.

The high school of the large cities has suffered as truly. A school with thirty or more teachers might well aspire to approximate the ideal of big institutions where a boy or girl from thirteen to nineteen could learn anything that it was well for him at that age to know. A rich elective system, the provision of technical and semi-professional education, the opportunity for work of the continuation-school type during two or more forenoons a week, and many other flexibilities of adaptation of the school to its pupils' natures and needs are here possible as they could never be in a ten-teacher school. The natural tendency of school boards would have been to favor such a university for the 'teens. But the innocent mistake of writers who, properly convinced that multiplication of courses in a five- to ten-teacher school meant superficiality and waste, insisted that it *always* meant superficiality and waste, has established the fad of regarding a simple program of studies composed of the staple algebra, geometry, English, two or more foreign languages, and the like, as the dignified and first-class thing in a high school. Two hundred students living within a mile of one high school travel four miles to a technical high school, though of the fifty teachers in the first, five or six might well teach them what they need to learn. Five hundred of the pupils in the first school are deprived of the opportunity of studying to some little extent the technical arts and industries, though they ought to do so.

It would be far more practicable for schools with twenty-five or more teachers to do satisfactorily two years' work in advance of the present four-year secondary course than it is for over half

of the high schools to do satisfactorily the work of the last two years of the present course. The large high schools could do the work better than a third of the colleges legally giving degrees, the third having eight or less instructors.

We may expect that as American education becomes more and more rationally organized, the small college will not pretend to be more than either a pleasant and cultured social resort for youth's leisure or a fitting school for the professional schools, higher technical schools and institutions for specialized study of the sciences of nature and of man. But we may also expect that the city high schools will assume this same function of fitting schools, not for college, but for these same professional schools, higher technical schools and universities—that the large high schools will become in fact what they are now in possibility.

The twenty-five teacher high school misses some of the social advantages of the small school. Teachers do not know one another. Pupils have less chance of becoming humanized and more danger of becoming institutionalized. Democracy loses an effective helper. Athletics become a question of finance rather than play. The boys mimic college fraternities and men's clubs in their social organizations. Perhaps such measures as the provision of a special teacher to act as social secretary may relieve these disadvantages. If they cannot be avoided, it is all the more necessary for the large high school to compensate by richer provision for the more purely intellectual and practical needs of its students. If the big city high school does no more than give such a program of studies as the traditional Massachusetts high school, it probably does not do as well by its students as the smaller schools. . . .

The institutions which we call by the same name, public high schools, cannot (and probably ought not if they could) be all made to fulfill similar aims or to be administered in similar fashion. There is no typical high school in any useful sense of the

word. Probably no one of all the thousands of high schools is doing the best possible thing for education, but most of them would do worse than they now do if they all did do the best possible thing for any one of them. There are faults to be corrected by the adoption of conventional practices, but there are also faults to be corrected by abandoning conventional practices. This is so widely true because the conventions have been established by a sort of school which represents but a very moderate fraction of secondary education.

## § 16. The Inefficiency of College Entrance Examinations[1]

The facts which I shall present concern the records in entrance examinations and the academic careers of all the students of Columbia College entering in 1901, 1902, and 1903, and especially the relation between their success in the entrance examinations and their success in college. From these facts it will be proved that even so carefully managed examinations as these are an extremely imperfect means of estimating an individual's fitness for college. The suggestions to be made concern a simple and practicable development of the work of the College Entrance Examination Board which would remedy the defects of examination systems and still not introduce the doubtful features of the usual certificate systems.

In 1901, 1902, and 1903 there entered Columbia College 253 students who have complete, or nearly complete, records of standings in entrance examinations and who stayed in college through the freshman year. I have complete records of the standing through senior year of 56 of these and complete records through junior year of 130. Detailed reference will be made here only to the 130 students whose college history can be investigated for three years or more, though the facts concerning the remaining 123 have been studied in detail and give abundant corroborative evidence.

The important facts concerning the relationship of success in entrance examinations to success in college work are given in Tables 62, 63, 64 and 65. They prove that we cannot estimate the latter from the former with enough accuracy to make the

[1] This section reprints portions of an article entitled "The Future of the College Entrance Examination Board" by Edward L. Thorndike, from the *Educational Review*, May, 1906 (Vol. XXXI, No. 5).

entrance examinations worth taking or to prevent gross and intolerable injustice being done to many individuals.

For instance, 6 students out of the 130 received the same average entrance mark—61. In their college work of junior year, 1 averaged a trifle above D; 1 half-way from D to C; 1 a little above C, and 2 received A in four subjects out of five, and B in the other. In freshman and sophomore year, the range was nearly as great.

Eleven students of the 130 received in the entrance examinations marks averaging 70 in each case. In their college work of junior year, they averaged all the way from D to A.

Of the students who were in the lower half of the group in the entrance examinations, nearly 40 per cent are found in the upper half in the last three years of college.

Of the dozen students who ranked highest in entrance, some were in the lowest fifth of the class by junior year.

If, knowing that 50 individuals ranked in the order Jones, Smith, Brown, etc., in their entrance marks, one were to wager that in the college work of, say, junior year, they would rank Jones, Smith, Brown, etc., as before, he would lose his bet in 47 cases out of the 50.

The record of eleven or more entrance examinations gives a less accurate prophecy of what a student will do in the latter half of his college course than does the college record of his brother! The correlation between brothers in intellectual ability is approximately .40, but that between standing in entrance examinations and standing in college of the same person is only .47 for junior year and .25 for senior year. Even in the case of sophomore year, the correlation is only .60.

The entrance examinations also bear internal evidence of their inadequacy as measures of fitness for college. If a student who fails in his first trial of an examination gets a vastly different mark a few months or even a year later, it is clear that the

examination in so far does not test capacity so much as the carefulness of the coaching or the diligence of the candidate's cram. As a matter of fact, in 150 cases of repeated examinations, the two marks from the same student show a median difference of *over 22* (the scale of marking being the common one of 100 down to 0). The differences between the earlier and later marks of one student are greater than the difference between the marks of different students chosen at random.

Moreover, the marks on which a student is admitted are not so good a test of his fitness to do the work of the college as the marks of his first trials. If the students are ranked by their first trials of the examinations, the order corresponds much more closely to their order of achievement in college than when they are ranked by their official entrance marks.

Where there are several examinations in one general subject, such as Latin, the different marks of the same individual in the one subject vary in such eccentric ways that an individual who is marked the lowest of twenty in one is at times marked the highest of twenty in the other. The average range of difference of an individual's separate marks in Latin in the entering class of 1902 was *over 26!*

The general inadequacy of the entrance examinations from which the colleges suffer is not so important as their enormous individual inaccuracies, from which individual students suffer.

The entrance marks often utterly misrepresent the fitness of a student for college work. For instance, there were 10 men out of the 130 who in their junior year got A (the highest mark given) in at least five studies. Their average marks at entrance were in some cases in the lowest tenth of the 130, barely above the passing mark. Had the passing mark been set the least bit higher, one of the very best students of the three college classes would have been debarred from entrance. There is every reason to believe that of those students who did yet worse in the entrance

examinations and so were shut out, a fairly large percentage would have done better in college than a third of those who were admitted. Sooner or later there will be some one so barred out who would, if admitted, have been the best man in his class. It is a moral atrocity to decide the fitness of an individual for college by a system which, when required to work to a moderate degree of accuracy, is wrong 47 times out of 50!

From many facts such as these, which the scientific reader can find in tables 62–64, it is certain that the traditional entrance examinations, even when as fully safeguarded as in the case of those given by the College Entrance Examination Board, do not prevent incompetents from getting into college; do not prevent students of excellent promise from being discouraged, improperly conditioned or barred out altogether; do not measure fitness for college well enough to earn the respect of students or teachers; and do intolerable injustice to individuals. There is surely room for improvement.

It is unprofitable to seek a remedy in any modification of the examination along conventional lines. Doubtless, more elaborate examinations, the employment of more readers and the like might alleviate the chief evil somewhat, but evolution in this direction is along the line of greatest resistance. It is conceivable that some of the colleges that maintain independent examinations for entrance may secure better results, though I should expect them to be worse. I wished to study the records of 200 Harvard students in connection with the 253 Columbia records, but did not succeed in obtaining President Eliot's permission to examine the records.

The usual certificating systems are not entirely suitable to the purposes of Eastern colleges. The geographical distribution of the secondary schools which send students to, say, Amherst or Princeton makes the direct examinations of schools exceedingly burdensome; the possibility that colleges might compete for the

support of important secondary schools is distasteful; the attempt to introduce certification generally would probably result in a return to chaotic individualism.

Moreover, there is one fundamental weakness in both systems as practiced; in intent and in execution effort is directed solely toward keeping unfit students out rather than toward getting desirable students in. Both systems are connected partly as cause and partly as effect, with a shortsighted neglect of the fact that, for the good of the social organism (and, for that matter, of the college, too), it is more important to give advanced education to one boy who most needs it, can profit most by it, and use it in the world's service than to prevent from entering upon it a hundred boys who are not able to measure up to its demands. Letting incompetents into college is, perhaps, poor economy, although in a well regulated college they do not stay long, or do more harm than they get good. But to make a college education an impossibility for the really capable boy, in whose case the education is an investment by society that will yield from a hundred to ten thousand per cent, is criminal.

My suggestion for the future development of the College Entrance Examination Board aims at securing a system that is, first of all, a positive force selecting for continued education those who deserve it; a system that will, in the second place, coöperate with secondary schools in their endeavors to improve the conditions and quality of secondary school work; a system also that will, though rigorous, still be just; a system that will be rational and measure directly fitness for college, not the mere opinion of inspectors or the length and assiduity of study, or the ingenious art of parading knowledge in a form to beguile examiners; finally, a system that will be a natural development of existing arrangements and will make full use of the admirable organization furnished by the Middle States board.

It is, in brief, that the colleges which now intrust to the board

the function of examining students, intrust to it also the function of crediting schools on the basis in each case of an examination of *the actual success in college of the candidates indorsed by that school.*

Suppose, for instance, that to the board was given authority to accredit any school whose graduates already in college had, in nine cases out of ten, done satisfactory work in their studies and been desirable members of the college community. Such an accredited school would be privileged to certify a student as "fit for college" and to certify further to what extent he had done the particular kinds of preparatory work required for the various units of the board's schedule. The new work of the board would be to obtain annually, or less often, records from the different colleges of their students classified as *Satisfactory* or *Unsatisfactory*. These records the board would sort out in accordance with its lists of secondary schools and their indorsed graduates. Some hours' computation of percentages would complete the work. The work of college admission committees would be to treat the certificates from accredited schools precisely as they now treat the certificates of the College Entrance Examination Board. The work of the accredited school would be to secure and fill out the general certificates of fitness for college and the special certificate of having taken courses qualified to fulfill such and such particular admission specifications. Students not certificated by their schools and students from schools not accredited by the board would be examined as now.

We would have, that is, neither of the conventional admission systems, but a rigorous, continuous, and absolutely impartial examination of each school on the basis of its actual work in furnishing candidates who demonstrated their fitness for college by their work in college.

Such a system would encourage boys and girls who were in the truest sense fit for college to go there, for the fundamental

certificate would be the outcome, not of a complex computation of what particular species of disciplines the pupil had undergone but of the judgment of the teachers who knew him best that he was really fit for college. The award of this general certificate would encourage many students of first-rate capacity and promise who lacked some of the particular preparation demanded by a college to proceed to secure it. A college education would become less the consequence of early parental decision and more the consequence of demonstrated capacity. The award of the general certificate would also encourage the colleges to admit on probation a student of excellent promise who, by some accident of fortune, had not taken the college preparatory course in high school; for they could then do so without elaborate special legislation and without incurring the reproach of lowering standards. The standard of capacity would, in such cases, be as high as ever and as high as anywhere.

Such a system would improve the work of the secondary schools by setting a higher standard of attainment and at the same time abandoning prescriptive interference. The main duty of the high schools is to train boys and girls to be capable and intelligent men and women. They and the public which supports them are willing to accept also the responsibility of fitting for college the small minority of their students who will go on to an academic degree; but they ought not to be asked to fit students primarily for an arbitrary set of examinations. With such a task, they cannot be expected to resist the temptation to give up a large part of the last two years to specific coaching for the process of examination taking. The proportion of college students who go on to professional courses is far greater than the proportion of high school students who go on to a college course, yet the colleges would think it an insane arrangement if they had to fit students for elaborate and arbitrary examinations in physiology, chemistry, bacteriology, and the like, or in the psychol-

ogy of religion, ecclesiastical history, church law, and Hebrew. The examination disease can be eliminated, and with an actual raising of standards, if a school's fitness to prepare for college is measured by the actual fitness of the students it prepares.

Such a method of accrediting is obviously just to schools. Now that a perfectly trustworthy body exists to receive reports from all colleges, no school can complain if it is denied credit until the records of its graduates improve. It is also just to individuals, so far as any system which the colleges would be willing to operate can be. Occasionally an able candidate who happens to have gone to an inefficient school or to have been misjudged by his teachers, will have to run the risk of proving his ability by the unfair test of arbitrary examinations, but at present *every* able candidate has to run this risk. Occasionally, an able candidate will be held back a year longer than he ought by over cautious teachers, but a few years will demonstrate to those high school teachers who do not already know it that success in college is dependent on capacity ten times as much as upon mere amount of high school training, and they will soon abandon the false notion that they can maintain the credit of their school by holding back pupils. They will never abandon it under the present examination system; for under such a condition it is true; quantity of drill *is* a means of securing high standings in arbitrary examinations. The present system is a paradise for stupid boys —with clever tutors. A sagacious tutor can get a hundred boys into college, not one of whom he would be willing to certify to as fit to succeed there.

Such a system is rational because it measures the ability of schools to fit for college, not their ability to forearm students against the twin cataclysms of preliminary and final examinations. It puts the premium on capacity and right habits of intellectual work, rather than on the mass of information held in solution at a given week. It avoids the dangers, possible under

the ordinary certificating systems, of misjudgment of schools by inadequate or eccentric inspection. It measures directly and exactly the fact we wish to measure. . . .

Finally, such a system would be established through a natural modification of the function of an already existing organ through an easy extension of the powers of the present board. No new machinery and only the simplest legislation is required. The only important change would be to add to the present duties and powers of the board the duty of rating schools by the success in college of the students they had vouched for and the power to accept from schools of a given rating a certificate that John Doe "is fit for college," and a certificate that John Doe "has done work equivalent to that recommended by the Middle States board for English 1, English 2, History 1," etc., etc. The colleges which approve the system would vote simply to accept the board's examinations of schools as they now accept its examinations of individual students. The work of the board and of college admission committees would be lightened.

Of the many administrative advantages of the plan, and of the possibility of unity of action amongst colleges throughout the country on the basis of a scheme so safe and yet so plastic, I do not care to speak, at least at this time. The system proposed is rational, just and practical. It positively encourages the right students to go to college instead of making laborious, but futile efforts to keep a few incompetents out. On these facts alone I rest my case.

Tables 62, 63, 64, and 65 show for each individual the relation between entrance standing and college standing. Horizontal position denotes the rank in entrance (the median of the highest eleven marks obtained). Vertical position denotes the rank in college studies (the average of the five highest marks obtained)—in Senior year in Table 62, in Junior year in Table 63, etc. Each

figure entered in the table means so many students. Thus in Table 62 the 1 at the upper left-hand corner means that one student scoring 60 in entrance scored 4 in the college work of Senior year. The other 1 in the same column means that one student scoring 60 in entrance scored 21 in college work. The 1 in the next vertical column means that one student scoring 61 in entrance scored 24 in college work. The vertical column under 70 would read: Of 10 students, each ranking 70 in entrance examinations, one ranked 15 in the college work of Senior year, one 16, four 18, one 19, one 21, one 22, and one 27.

The values 60, 61, 62, etc., up to 95 of the horizontal scale, are directly obtained from the entrance marks, which are given on the ordinary scale of from 100 down. The values 4, 5, 6, up to 30 of the vertical scale, are obtained from the college records of A B C D and F by taking A = 6, B = 4, C = 3, D = 1 and F = 0.[1] Thus 30 = five As, 28 = four As and one B, 27 = four As and one C, 26 = three As and two Bs, 25 = three As, one B and one C, or four As and one D, etc., etc.

[1] A = 10, B = 7, C = 5, D = 2, and F = 0 would perhaps have been juster.

TABLE 62

RELATION OF STANDING IN ENTRANCE EXAMINATIONS TO STANDING IN COLLEGE—SENIOR YEAR

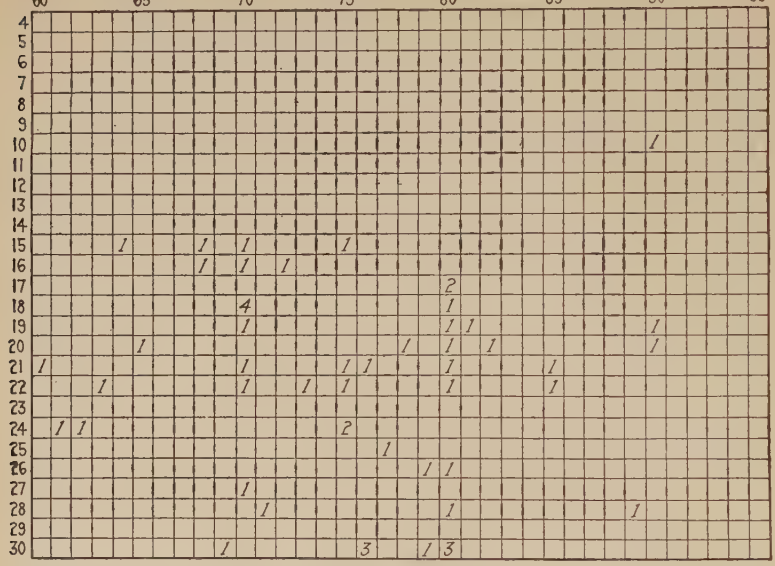



TABLE 63

RELATION OF STANDING IN ENTRANCE EXAMINATIONS TO STANDING IN COLLEGE—JUNIOR YEAR

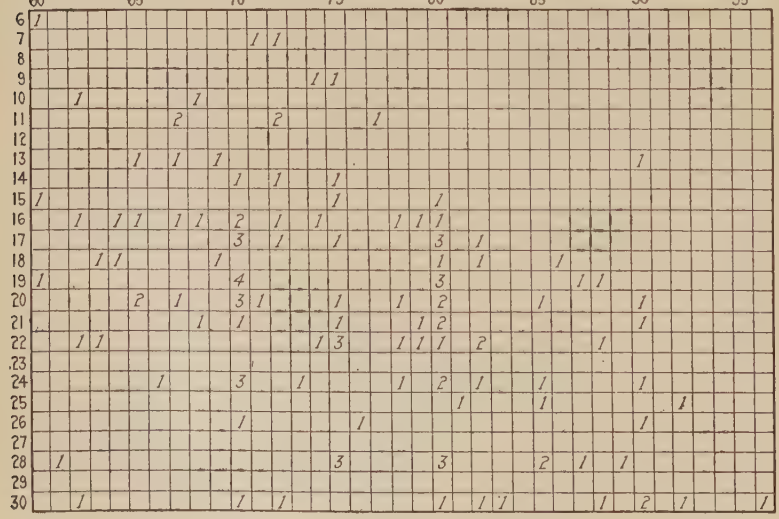


TABLE 64

RELATION OF STANDING IN ENTRANCE EXAMINATIONS TO STANDING IN COLLEGE—SOPHOMORE YEAR

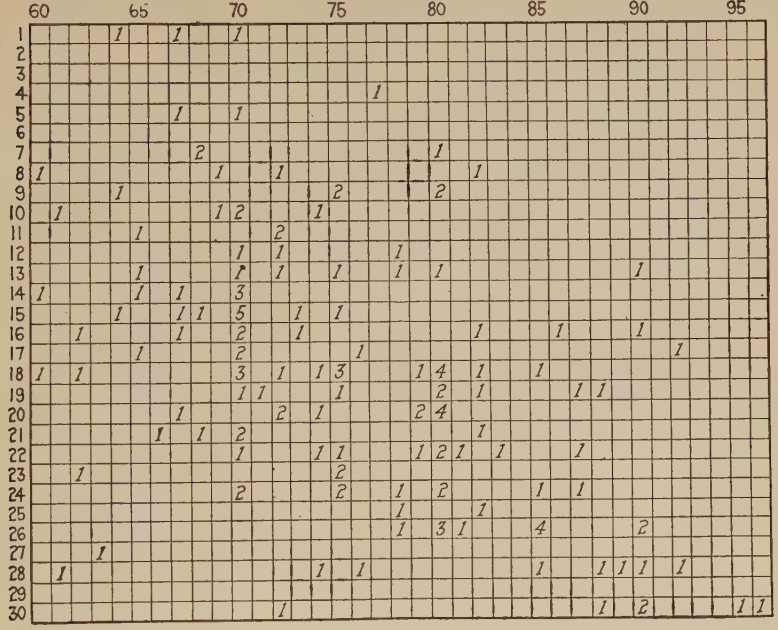
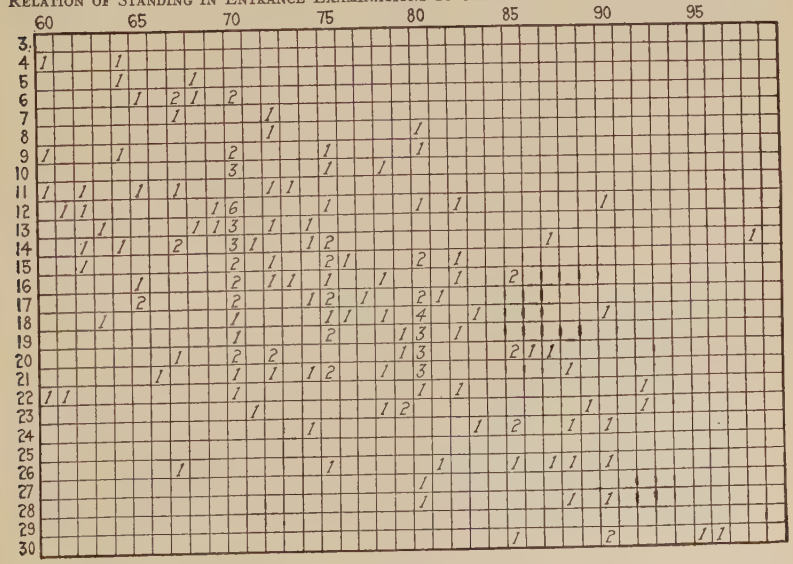



TABLE 65

RELATION OF STANDING IN ENTRANCE EXAMINATIONS TO STANDING IN COLLEGE—FRESHMAN YEAR



## § 17. The Studies Actually Taken for the A. B. Degree

In view of the frequent discussions and proposals with respect to the course of study for the bachelor's degree in American colleges, it seems desirable to present the facts concerning the actual courses taken by representative students. Admiration of a set of printed requirements is misguided if in fact they are not followed; and criticism of follies which a given scheme is supposed to encourage is wasted if in fact it does not produce them.

I therefore give in the tables that follow (Tables 66-75) the actual composition of the work done for the A. B. degree by 391 men students graduating in 1909 [1]—21 at Columbia, 36 at Bowdoin, 42 at Cornell, 50 at Harvard, 49 at Princeton, 20 at Stanford, 38 at Wesleyan, 40 at Williams, and 95 at Yale; also for 22 women at Wellesley. These individuals were all chosen at random, being the first in alphabetical order.

The tables give for each student separately the thousandths of his total course [2] devoted to:

1. Latin, Greek and Semitic
2. German, French, Spanish and Italian
3. English
4. Philosophy, Psychology, Logic and Ethics

[1] For the original data from Columbia, Cornell, Princeton and Stanford, I am indebted to Mr. F. P. Keppel, Dean of Columbia College. For those from Yale, I am indebted to Dr. C. H. Judd, Director of the School of Education of the University of Chicago. The other data I owe to the courtesy of the administrative officers of the several institutions.

[2] Approximately. The number of points made in each subject was decided, not by their sum in every case, but by the total degree requirement or the average of their sums for all the students reported from the college in question. This is in the end fairer, but as a result the sum of the numbers in a row may not total to exactly one thousand.

5. History, Economics, Government and Sociology
6. Physics and Chemistry
7. Biological Sciences
8. Other Natural Sciences
9. Mathematics
10. Music and Art.

In these tables each horizontal line represents the work for the bachelor's degree of one individual. The career he expects to follow is stated where it is known. Each entry represents the number of thousandths of the "hours" or "points" required in all for the degree which the individual at the left of the entry gave to the subject at the top of the column in which the entry is.

Thus the first line of the Bowdoin table (Table 66, on page 190) reads: Individual No. 1, intending to be a lawyer, earned 72 thousandths of his points in ancient languages, 54 in modern foreign language, 263 in English, and so on.

I am convinced that a careful study of these individual curricula is the best, and perhaps an indispensable, introduction to any scientific study of the college course. It will be well to examine them one by one with specific questions in mind, such as: Which are apparently bad combinations? How do the combinations at Harvard, under a system of free election, but within the non-professional studies, differ from those in the other colleges save Stanford? How do the Stanford combinations, under a system where the student chooses a major subject, and the head of that department in large measure chooses the courses for the student, differ from those at Harvard on the one hand and at the other colleges on the other hand? How far do students avail themselves of professional options, when such are offered, as at Columbia and Stanford and, to some degree, at Cornell? How much specialization was there under the regulations in force in these colleges in 1905–9? How much "scattering" was there?

TABLE 66

BOWDOIN

| | | Anc. Lan. | Mod. Lan. | English | Phil. Psy. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 1 | law | 72 | 54 | 263 | 54 | 354 | 81 | 81 | 27 | | | |
| 2 | " | 27 | 318 | 290 | 54 | 163 | | 81 | 27 | 72 | | |
| 3 | " | 72 | 245 | 263 | 54 | 190 | 54 | | | 72 | ed. | 27 |
| 4 | " | 72 | 81 | 263 | 54 | 218 | 54 | 27 | 36 | 127 | ed. | 27 |
| 5 | " | | 163 | 290 | 54 | 163 | 54 | | 36 | 127 | ed. | 54 |
| 6 | teaching | 100 | 381 | 236 | | 81 | | 27 | 27 | | | |
| 7 | " | | 381 | 290 | | 109 | 109 | | | 72 | | |
| 8 | " | | 300 | 154 | | 54 | 218 | 54 | 27 | 54 | dr. | 54 |
| 9 | " | | 163 | 290 | 54 | 218 | 54 | 136 | | 72 | ed. | 27 |
| 10 | medicine | 127 | 163 | 290 | | 54 | 54 | | | 72 | med. | 250 |
| 11 | " | | 272 | 127 | 27 | 109 | 81 | 81 | | 72 | med. | 250 |
| 12 | " | | 163 | 181 | | 136 | 109 | 81 | | 72 | med. | 250 |
| 13 | " | | 163 | 181 | 54 | | 381 | | 27 | 181 | dr. | 54 |
| 14 | " | 27 | 435 | 263 | 54 | 54 | 54 | | | 72 | ed. | 54 |
| 15 | ? | 127 | 109 | 318 | 163 | 136 | 54 | 81 | 27 | | | |
| 16 | " | 72 | 327 | 209 | 27 | 163 | 109 | 27 | | 72 | | |
| 17 | " | 72 | 272 | 263 | 54 | 54 | 218 | | | 72 | | |
| 18 | " | 127 | 327 | 236 | 54 | 190 | 54 | | | 18 | | |
| 19 | " | | 272 | 209 | 54 | 81 | 163 | 81 | | 72 | | |
| 20 | " | 172 | 272 | 290 | 54 | 127 | 54 | | 27 | | | |
| 21 | " | 72 | 272 | 290 | 54 | 272 | | | | | | |
| 22 | " | 36 | 272 | 209 | 54 | 300 | | 27 | | 36 | ed. | 54 |
| 23 | " | | 163 | 318 | 54 | 218 | 54 | 27 | 27 | 72 | ed. | 27 |
| 24 | chemist | 72 | 272 | 181 | 27 | | 272 | | | 127 | dr. | 54 |
| 25 | " | 72 | | 318 | 54 | 136 | 300 | 27 | 27 | | ed. | 54 |
| 26 | engineering | 109 | 163 | 181 | 27 | 54 | 272 | | 63 | 154 | dr. | 81 |
| 27 | electrician | 72 | 272 | 236 | 27 | 136 | 136 | 54 | 54 | | ed. | 27 |
| 28 | forestry | 127 | 218 | 290 | 27 | 27 | 81 | 54 | 27 | 72 | ed. | 54 |
| 29 | manufacturing | 72 | 381 | 181 | 54 | 190 | 54 | | | 72 | ed. | 54 |
| 30 | " | | 272 | 209 | 54 | 245 | 136 | | | 72 | | |
| 31 | " | 72 | 381 | 209 | 54 | 109 | 109 | | | 72 | | |
| 32 | express | 36 | 218 | 209 | 27 | 381 | 81 | 27 | 27 | 36 | | |
| 33 | banker | 318 | 327 | 127 | | | 109 | | 45 | 127 | | |
| 34 | business | 27 | 190 | 290 | 54 | 245 | 54 | 27 | | 72 | ed. | 54 |
| 35 | undertaker | 145 | 272 | 181 | 54 | 54 | 190 | 54 | | | | |
| 36 | journalist | 27 | 272 | 290 | 54 | 272 | | | | 72 | | |

Also 9 for each student in hygiene.
dr. = Drawing; ed. = Education; med. = Medicine.

TABLE 67

COLUMBIA

| | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. | Art Mus. | Education | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| 1 | 80 | 100 | 175 | 300 | 175 | 133 | 50 | | 50 | 33 | | |
| 2 | 100 | 250 | 117 | 267 | 100 | | 100 | | | | | 500 engineering |
| 3 | 50 | 225 | 87 | 50 | 50 | 33 | 50 | | 50 | | | |
| 4 | 217 | 125 | 150 | 50 | 217 | 133 | 33 | | 25 | 33 | | |
| 5 | 133 | 367 | 83 | 75 | 50 | 83 | 33 | | 50 | | 42 | 250 law |
| 6 | 50 | 50 | 83 | 50 | 50 | 67 | 67 | | 83 | 33 | 42 | 500 architecture |
| 7 | 100 | | 225 | 100 | 100 | 67 | 67 | | 50 | 33 | | 250 law |
| 8 | 383 | 67 | 83 | 100 | 75 | 67 | 67 | | 50 | | 50 | |
| 9 | 83 | 100 | 233 | 150 | 283 | 67 | 100 | | | | | |
| 10 | 117 | 150 | 117 | 50 | 150 | 117 | | 50 | 50 | | | 250 law |
| 11 | 50 | 200 | 183 | 75 | 200 | 64 | | 50 | 17 | | | 250 law |
| 12 | 433 | 100 | 117 | 150 | | 67 | | | 33 | | 17 | |
| 13 | 50 | 100 | 83 | 100 | 50 | 50 | 100 | | 33 | | | 500 medicine |
| 14 | 150 | 217 | 300 | 158 | 133 | 67 | | | 50 | | | |
| 15 | 50 | 233 | 233 | 100 | 100 | 67 | | 50 | 33 | 50 | | 100 law |
| 16 | 208 | 158 | 100 | 75 | 100 | 100 | | | 50 | 17 | | 250 law |
| 17 | 100 | 233 | 150 | 50 | 150 | 67 | 67 | | 33 | | | 250 law |
| 18 | 50 | 25 | 83 | 100 | 100 | 33 | 67 | | 267 | | 350 | |
| 19 | 50 | 175 | 167 | 183 | 83 | 33 | 33 | 33 | 50 | | | 250 law |
| 20 | 50 | 167 | 83 | 50 | 50 | 117 | | | 83 | | | 500 engineering |
| 21 | 50 | 208 | 142 | 83 | 142 | 50 | 67 | 33 | | | 60 | 250 law |
| 22 | | 100 | 83 | 100 | 50 | 67 | 167 | | 50 | | | 500 medicine |

Also 33 for each student in gymnasium.

N

TABLE 68

CORNELL

| | | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Education | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. | Drawing | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | | 5 | 6 | 7 | 8 | 9 | 10 | |
| 1 | law | 110 | 141 | 265 | 94 | | 203 | 47 | | | 47 | 83 | |
| 2 | " | 31 | | 180 | 102 | | 344 | | | 47 | 47 | | 234 law |
| 3 | " | 110 | 305 | | 141 | | 375 | 47 | | | | | |
| 4 | " | | 70 | 94 | 164 | | 367 | 94 | | | 78 | | 31 law |
| 5 | " | 94 | 94 | 180 | 141 | | 453 | | | | 47 | 31 | |
| 6 | " | | 180 | 172 | 47 | | 461 | | | 78 | | | |
| 7 | " | 63 | 188 | 23 | 273 | | 63 | 31 | | 63 | 47 | | 234 law |
| 8 | " | | 125 | 188 | 63 | | 273 | | | | 78 | | 258 law |
| 9 | " | | 47 | 211 | 70 | | 578 | | 31 | | | | |
| 10 | law or teaching | 203 | 234 | 47 | 47 | 117 | 305 | | | | | | |
| 11 | teaching | | 183 | 47 | 94 | 94 | 47 | 86 | | 47 | 391 | 47 | |
| 12 | " | | 188 | | | | | 477 | | | 359 | 31 | |
| 13 | " | 70 | 438 | 70 | 133 | 180 | 16 | | | | 78 | | |
| 14 | " | 55 | 281 | 78 | 16 | 125 | 508 | | | | | | |
| 15 | " | 133 | 78 | 485 | 133 | 31 | 102 | | | 47 | | | 31 a |
| 16 | " | 359 | 242 | 149 | 94 | | 211 | 47 | | | | | |
| 17 | " | 203 | 125 | 47 | 31 | | 516 | | | 47 | 47 | 31 | |
| 18 | " | | 94 | 117 | | | 70 | 203 | 375 | 94 | 125 | | |
| 19 | (d) | | 313 | 94 | 30 | 110 | | | 70 | | | | 164 a 125 |
| 20 | teaching or ? | 219 | 164 | 31 | 23 | 133 | 39 | | | | 321 | | |
| 21 | ? | 273 | 172 | 94 | 47 | 141 | 172 | 78 | | | 47 | | |
| 22 | ? | | 94 | 211 | 110 | | 391 | 47 | | 39 | 78 | | |
| 23 | ? | 156 | 227 | 250 | 47 | | 23 | 47 | 47 | 16 | 63 | | 16 a |
| 24 | ? | | 47 | | | | 8 | 695 | | 47 | 94 | | 23 b |
| 25 | ? | 211 | 547 | 188 | | 31 | | | | | | | |
| 26 | ? | 110 | 188 | 141 | 47 | | 391 | 31 | | 78 | 31 | 23 | |
| 27 | medicine | | 188 | 47 | 86 | | | 196 | 219 | | | 16 | 297 medicine |
| 28 | " | 16 | 125 | 117 | 23 | | 78 | 234 | 149 | 23 | 47 | | 297 " |
| 29 | " | 16 | 149 | 47 | | | 47 | 258 | 133 | 47 | 39 | 31 | 297 " |
| 30 | " | 63 | 110 | 141 | 125 | | 117 | 149 | 125 | | | | |
| 31 | " | 47 | 117 | 94 | 47 | | | 180 | 227 | | 78 | | 297 " |
| 32 | chemist | | | | | | 8 | 758 | | 63 | 78 | | 23 b |
| 33 | " | | 47 | | | | | 727 | | 70 | 78 | | 23 b |
| 34 | " | | 47 | | | | | 775 | | 94 | 55 | | 23 b |
| 35 | " | | 70 | | | | 47 | 766 | | 63 | 86 | | 23 b |
| 36 | " | | 141 | | | | | 758 | | 94 | 125 | | 23 b |
| 37 | dyer | | 149 | 70 | 23 | | 125 | 383 | | 23 | | 78 | 23 c |
| 38 | manufacturing | | 78 | 141 | 23 | | 125 | 205 | | 78 | | | 23 b 188 engineering |
| 39 | " | | 70 | 258 | 23 | | 531 | 16 | | 110 | | | |
| 40 | " | 10 | 47 | 336 | 47 | | 336 | 47 | 63 | 141 | | | |
| 41 | painter | | 94 | 329 | 117 | | 94 | 78 | 55 | 16 | | | 31 a 47 b |
| 42 | business | 63 | 336 | 47 | 23 | 55 | 117 | 188 | | | | 47 | |

a = Architecture. b = Drawing. c = Unknown; records as M. A. (d) = Supervisor of Drawing.

TABLE 69

HARVARD

| | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. | Art, Mus. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 1 | | 235 | 118 | 29 | | 471 | 29 | | 59 | | |
| 2 | | 176 | 88 | | 59 | 412 | | 88 | 118 | | |
| 3 | 118 | 59 | 353 | 382 | 59 | | | | | | |
| 4 | | 676 | 147 | | 235 | | | | | | |
| 5 | 118 | 118 | 59 | 59 | 118 | 118 | | | 294 | 59 | |
| 6 | | 176 | 265 | 147 | 471 | 59 | | | | 59 | |
| 7 | | 118 | 176 | 147 | 206 | 118 | | 29 | | 294 | 118 a. 29 en. |
| 8 | 294 | 118 | 118 | 29 | 353 | 59 | | 29 | 88 | 59 | |
| 9 | | 235 | 147 | | 617 | | 29 | | | | 59 ed. |
| 10 | | 176 | 176 | | 235 | 118 | | 176 | | 59 | 88 m. 88 en. |
| 11 | | 88 | 382 | 88 | 176 | 147 | | | | 59 | |
| 12 | | 59 | 88 | | 59 | 235 | | | | | 676 en. |
| 13 | | 176 | 147 | | 176 | | | | 59 | 176 | 29 m. 118 a. 59 m. |
| 14 | 118 | 59 | 147 | 88 | 529 | | | | | | |
| 15 | 29 | 118 | 206 | 118 | 294 | 59 | 59 | 29 | | 118 | |
| 16 | 118 | 176 | 176 | 118 | 441 | | | | | | |
| 17 | | 59 | 59 | 29 | 186 | 59 | 59 | | 118 | | |
| 18 | 176 | 176 | 118 | 59 | 412 | | | | | 118 | |
| 19 | | 59 | 29 | | 176 | 59 | | 88 | 118 | | 412 en. |
| 20 | | | 118 | | 147 | 59 | 59 | 559 | | | 29 m. |
| 21 | 118 | 176 | 353 | 206 | 88 | | | | | | |
| 22 | | 118 | 382 | 235 | 235 | 59 | | | | | |
| 23 | | 59 | 265 | 176 | 412 | 59 | | | | 59 | |
| 24 | | 176 | 29 | 118 | 598 | 59 | | | | | |
| 25 | | 235 | 118 | 235 | 265 | | | | | | 235 ed. |
| 26 | | 59 | 118 | 176 | 235 | 59 | | | 29 | 176 | 29 en. |
| 27 | 59 | 265 | 176 | 294 | 294 | 59 | | | | | |
| 28 | 147 | 118 | 176 | 118 | 294 | | | | | | 88 en. |
| 29 | 235 | 176 | 59 | | 59 | 176 | 59 | | 176 | | |
| 30 | | 598 | 147 | | 471 | | | | | | |
| 31 | | 382 | 176 | 88 | 265 | | | | | 59 | |
| 32 | 29 | 147 | 176 | 59 | 176 | 59 | 118 | 29 | | 118 | 29 m. 118 en. |
| 33 | 176 | 471 | 265 | | 59 | | | | | | |
| 34 | | 176 | 147 | 176 | 559 | 59 | | | | | |
| 35 | 59 | 118 | 324 | 147 | 294 | 99 | | | 29 | 88 | |
| 36 | 235 | 471 | 353 | 88 | | | 59 | | | | |
| 37 | 59 | 59 | 147 | 118 | 441 | 59 | 59 | | 99 | 59 | |
| 38 | 59 | 324 | 147 | | 471 | | | | | 118 | |
| 39 | | 235 | 382 | 59 | 324 | | | | | | |
| 40 | 118 | 147 | 265 | 88 | 324 | | 59 | | | | 59 ar. |
| 41 | | 147 | 147 | 29 | 353 | 59 | | | | 235 | 59 a. |
| 42 | 59 | 412 | 59 | 59 | 324 | | | | 59 | | |
| 43 | | 118 | 59 | 176 | 618 | 59 | | | 205 | | |
| 44 | 294 | 59 | 118 | | 118 | 147 | | 29 | | | 147 en. |
| 45 | | 265 | 206 | 88 | 382 | | | | | 59 | |
| 46 | | 235 | 118 | | 471 | 59 | | | | 118 | |
| 47 | | 235 | 676 | 235 | 118 | | | | | | |
| 48 | | 59 | | 147 | 676 | | | 29 | 59 | | |
| 49 | | 118 | 59 | 59 | 647 | | 59 | 58 | | | |
| 50 | | 176 | 176 | 88 | 353 | | 59 | | 29 | 176 | 29 m. 29 en. |

NOTES.—a. = Architecture and landscape architecture; ar. = Archæology; ed. = Education; en. = Engineering; m. = Mining.

TABLE 70
PRINCETON

| | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. | Art, Mus. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 1 | 177 | 177 | 129 | 48 | 315 | 48 | | 24 | 64 | | |
| 2 | 298 | 32 | 153 | 73 | 315 | 48 | | | 64 | | |
| 3 | 323 | 32 | 299 | 48 | 145 | 48 | | | 64 | | |
| 4 | 177 | 177 | 153 | 48 | 315 | 48 | | | 64 | | |
| 5 | 177 | 177 | 81 | 48 | 339 | 48 | | | 64 | | |
| 6 | 202 | 129 | 81 | 48 | 315 | 73 | | 24 | 113 | | |
| 7 | 177 | 129 | 250 | 48 | 218 | 48 | | | 64 | 48 | |
| 8 | 177 | 129 | 153 | 48 | 363 | 48 | | | 64 | | |
| 9 | 226 | 81 | 56 | 121 | 387 | 48 | | | 64 | | |
| 10 | 202 | 105 | 153 | 48 | 303 | 48 | | 24 | 64 | 24 | |
| 11 | 177 | 129 | 129 | 48 | 339 | 48 | | 24 | 64 | | 24 a |
| 12 | 177 | 81 | 153 | 97 | 315 | 48 | | | 113 | | |
| 13 | 177 | 129 | 56 | 48 | | 315 | | 24 | 113 | | 169 b |
| 14 | 177 | 177 | 153 | 48 | 315 | 48 | | | 64 | | |
| 15 | 177 | 129 | 177 | 291 | 97 | 48 | | | 64 | | |
| 16 | 177 | 81 | 177 | 48 | 315 | 48 | | 24 | 64 | | 48 a |
| 17 | 202 | 129 | 105 | 97 | 363 | 48 | | | 64 | | |
| 18 | 177 | 129 | 323 | 48 | 145 | 48 | | | 113 | | |
| 19 | 177 | 81 | 153 | 73 | 339 | 48 | | 24 | 64 | | 24 c |
| 20 | 177 | 81 | 153 | 97 | 339 | 48 | | 24 | 64 | | |
| 21 | 226 | 430 | 56 | 48 | 48 | 48 | | 24 | 64 | | 48 d |
| 22 | 202 | 105 | 81 | 48 | 339 | 48 | | 24 | 113 | | |
| 23 | 274 | 105 | 347 | 97 | 48 | 48 | | | 64 | | |
| 24 | 177 | 129 | 299 | 48 | 145 | 48 | 24 | 48 | 64 | | |
| 25 | 177 | 145 | 129 | 48 | 315 | 97 | | 73 | 64 | 24 | 24 c |
| 26 | 177 | 105 | 105 | 48 | 315 | 48 | | | 64 | | |
| 27 | 177 | 81 | 177 | 48 | 121 | 121 | 194 | | 64 | | |
| 28 | 177 | 32 | 105 | 48 | 315 | 97 | | 97 | 64 | | 48 c |
| 29 | 177 | 32 | 105 | 48 | 315 | 97 | | 97 | 64 | | 48 d |
| 30 | 250 | 105 | 299 | 48 | 97 | 48 | 24 | 48 | 64 | | |
| 31 | 226 | 32 | 129 | 73 | 315 | 97 | 24 | 24 | 64 | | |
| 32 | 468 | 274 | | 48 | 48 | 48 | | | 64 | | |
| 33 | 185 | 105 | 299 | 48 | 73 | 73 | | | 64 | 48 | |
| 34 | 250 | 32 | 177 | 48 | 339 | 48 | | 24 | 64 | | |
| 35 | 177 | 323 | 177 | 48 | 121 | 48 | | 24 | 64 | | |
| 36 | 370 | 32 | | 339 | 48 | 48 | | | 113 | | |
| 37 | 177 | 32 | 177 | 48 | 315 | 48 | | 24 | 113 | 24 | 24 c |
| 38 | 250 | 177 | 347 | 97 | | 48 | | | 64 | | |
| 39 | 177 | 129 | 153 | 48 | 363 | 48 | | | 64 | | |
| 40 | 177 | 105 | 153 | 48 | 316 | 97 | | 24 | 64 | | |
| 41 | 177 | 81 | 81 | 48 | 339 | 73 | | 48 | 64 | 24 | 48 d |
| 42 | 177 | 129 | 105 | 97 | 315 | 73 | | | 64 | | 24 c |
| 43 | 177 | 129 | 323 | 73 | 169 | 48 | | | 64 | 64 | 24 |
| 44 | 177 | 129 | 177 | 48 | 315 | 48 | | 24 | 64 | | |
| 45 | 177 | 81 | 153 | 97 | 339 | 48 | | | 64 | | 24 a |
| 46 | 202 | 129 | 105 | 97 | 339 | 48 | | | 64 | | |
| 47 | 274 | 32 | 153 | 48 | 339 | 48 | | 24 | 64 | | |
| 48 | 177 | 105 | 347 | 48 | 145 | 48 | | | 64 | 48 | 48 d |
| 49 | 177 | 105 | 56 | 48 | 315 | 145 | 48 | 24 | 64 | | |

a = Biblical literature. b = Graphics, graphic statics and geodesy. c = Geodesy. d = Architecture.

TABLE 71

STANFORD

| | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. | Law | Engineering | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | |
| 1 | 25 | 132 | | 33 | 140 | 140 | 372 | | | 91 | | |
| 2 | 148 | 47 | 101 | 85 | 194 | | | | 31 | 326 | (1) | |
| 3 | 50 | 50 | 83 | | 670 | | 41 | | | 83 | | |
| 4 | | | | | | 121 | | 48 | 242 | 32 | 532 | 24 d |
| 5 | | | | | | 145 | | | 234 | | 597 | |
| 6 | 17 | 83 | 140 | 42 | 331 | | 74 | | 17 | 273 | 17 | |
| 7 | | | | | | 149 | | | 240 | | 612 | |
| 8 | 33 | | 132 | 58 | 331 | | 83 | | | 322 | | |
| 9 | | | | | | 161 | | 339 | 274 | | 274 | |
| 10 | | 50 | 174 | 33 | 355 | | 50 | 25 | | 273 | | |
| 11 | 198 | | 298 | 25 | 331 | | 74 | | 33 | | | 17 ed. |
| 12 | 32 | 127 | 167 | 32 | 262 | | 48 | | 48 | 262 | | |
| 13 | | | | | | 109 | | 16 | 225 | 16 | 597 | 16 d |
| 14 | 31 | 240 | 78 | 23 | 326 | | | | | 318 | | |
| 15 | | 157 | | | | 471 | 83 | 107 | 149 | 17 | | |
| 16 | | | | | | 33 | | 58 | 240 | | 653 | |
| 17 | 17 | 232 | 140 | 25 | 240 | | | 25 | | 273 | | 25 d |
| 18 | | 147 | 31 | | | 411 | | 16 | 225 | | 163 | |
| 19 | | 140 | 78 | 62 | 380 | | 16 | 25 | | 287 | | |
| 20 | 8 | | 24 | 24 | 97 | 137 | 202 | 25 | 185 | 32 | 15 | 242 ed. |

d. = Drawing. ed. = Education.

[1] Also 23 art, 16 drawing and 16 ed. Also for all students save 5, 7, 14 and 18, from 8 to 50 in gymnasium.

TABLE 72

WELLESLEY

| | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. | Art. | Hygiene | Biblical History | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | | |
| 1 | | 130 | 111 | 56 | 111 | 222 | 185 | 56 | 74 | 56 | 19 | 93 | |
| 2 | | 463 | 260 | 56 | 56 | | | 56 | 74 | | 19 | 74 | |
| 3 | | 130 | 333 | 111 | 241 | | 56 | | 74 | | 19 | 93 | |
| 4 | | 74 | 111 | 56 | 222 | 407 | | 56 | 74 | | 19 | 74 | |
| 5 | | 352 | 260 | 56 | 111 | 130 | | | 74 | | 19 | 74 | |
| 6 | | 74 | 407 | 83 | 194 | | 56 | 56 | 74 | | 19 | 93 | |
| 7 | | 185 | 296 | 56 | 111 | 74 | | | 74 | 93 | 19 | 74 | 56 ed. |
| 8 | | | 379 | 56 | 157 | | | 56 | 74 | | 19 | 74 | |
| 9 | | 537 | 167 | 56 | | | 56 | 56 | 74 | | 19 | 111 | |
| 10 | | 74 | 148 | 56 | 167 | | 241 | 56 | 185 | | 19 | 93 | |
| 11 | 260 | 130 | 204 | 56 | 74 | | | 111 | 74 | | 19 | 93 | 56 ed. |
| 12 | | 352 | 167 | 56 | | 130 | | 56 | 185 | | 19 | 93 | |
| 13 | | 185 | 352 | 56 | 111 | 56 | 74 | | 74 | | 19 | 74 | 56 ed. |
| 14 | 74 | 260 | 167 | 56 | | 56 | | 56 | 185 | 56 | 19 | 93 | 56 ed. |
| 15 | | 352 | 130 | 56 | 56 | 56 | 167 | | 74 | | 19 | 93 | 56 ed. |
| 16 | | 74 | 148 | 56 | | | 74 | | 74 | 537 | 19 | 74 | |
| 17 | | 296 | 333 | 56 | | | 74 | 56 | 74 | | 19 | 93 | 56 ed. |
| 18 | | 74 | 426 | 56 | 167 | | | 167 | 74 | | 19 | 74 | |
| 19 | | 287 | 250 | 56 | 111 | 185 | | | 74 | | 19 | 74 | |
| 20 | 74 | 352 | 241 | 56 | 56 | 56 | 56 | | 74 | 93 | 19 | 93 | |
| 21 | | 130 | 352 | 56 | 74 | | 56 | | 74 | 93 | 19 | 93 | 56 ed. |
| 22 | 204 | | 389 | 56 | 74 | | | 56 | 74 | 111 | 19 | 74 | |

TABLE 73

WESLEYAN

| | | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | teaching | 133 | 150 | 117 | 59 | 17 | 142 | 133 | 150 | 67 |
| 2 | " | 67 | 117 | 133 | 92 | 267 | 100 | 50 | 17 | 183 |
| 3 | " | 133 | 150 | 100 | 125 | 33 | 325 | 133 | 83 | 133 |
| 4 | " | 67 | 50 | 842 | 159 | 33 | 67 | 100 | 83 | 67 |
| 5 | " | 133 | 217 | 233 | 142 | 33 | 83 | 67 | | 67 |
| 6 | " | 150 | 300 | 133 | 109 | 100 | 67 | 17 | | 67 |
| 7 | " | 133 | 183 | 183 | 100 | 50 | 100 | 267 | | 67 |
| 8 | " | 167 | 150 | 175 | 159 | 67 | 150 | 33 | | 117 |
| 9 | " | 133 | 450 | 175 | 42 | 83 | 87 | 33 | | 67 |
| 10 | " | 333 | 200 | 233 | 100 | | 87 | 50 | 33 | |
| 11 | " | 217 | 200 | 175 | 83 | 67 | 83 | 33 | 33 | 67 |
| 12 | " | 200 | 200 | 175 | 109 | 67 | 83 | 50 | | 67 |
| 13 | " | 133 | 406 | 242 | 159 | 33 | 83 | 17 | | 67 |
| 14 | " | 67 | 133 | 425 | 92 | 33 | 17 | 133 | 50 | 67 |
| 15 | law | 67 | 167 | 200 | 75 | 350 | | 50 | 17 | 67 |
| 16 | " | 100 | 183 | 233 | 75 | 292 | 67 | 50 | | 117 |
| 17 | " | 133 | 150 | 225 | 75 | 200 | 117 | 50 | 17 | 67 |
| 18 | " | 67 | 100 | 200 | 192 | 317 | 33 | 83 | 50 | 67 |
| 19 | " | 133 | 217 | 125 | 75 | 267 | 183 | | | 150 |
| 20 | " | 67 | 283 | 159 | 59 | 167 | 67 | 67 | 17 | 73 |
| 21 | ministry | 133 | 133 | 325 | 225 | 67 | 67 | 17 | 33 | 67 |
| 22 | " | 133 | 100 | 333 | 142 | 67 | 67 | 50 | 83 | 67 |
| 23 | medicine | 183 | 250 | 142 | 92 | 33 | 83 | 200 | | 44 |
| 24 | chemist | 158 | 258 | 83 | 42 | 83 | 442 | 50 | | 142 |
| 25 | " | 67 | | 109 | 142 | 33 | 392 | 100 | 50 | 67 |
| 26 | science | 133 | 150 | 100 | 117 | 67 | 83 | 217 | | 67 |
| 27 | business | 67 | 83 | 209 | 175 | 183 | 117 | 117 | 17 | 67 |
| 28 | " | 133 | 200 | 159 | 92 | 33 | 292 | 17 | | 117 |
| 29 | " | 67 | 100 | 133 | 225 | 133 | 83 | 75 | 33 | 67 |
| 30 | " | 133 | 233 | 250 | 92 | 133 | 117 | 133 | | 67 |
| 31 | " | 67 | 317 | 125 | 142 | | 142 | 133 | 50 | 67 |
| 32 | " | 133 | 150 | 117 | 109 | 67 | 300 | 33 | | 167 |
| 33 | " | 67 | 317 | 225 | 75 | 150 | 83 | 67 | 50 | 67 |
| 34 | philanthropy | 250 | 167 | 167 | 75 | 67 | 192 | | 33 | 117 |
| 35 | insurance | 133 | 217 | 110 | 59 | 167 | 183 | 67 | 33 | 67 |
| 36 | civil service | 133 | 317 | 109 | 125 | 92 | 117 | 50 | 33 | 67 |
| 37 | publishing | 67 | 67 | 375 | 42 | 267 | 59 | 83 | | 44 |
| 38 | journalism | 133 | 50 | 325 | 75 | 350 | 25 | | | 67 |

TABLE 74

WILLIAMS

| | | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | law | 267 | 100 | 217 | 125 | 150 | 67 | 33 | | 67 |
| 2 | " | 75 | 217 | 275 | 25 | 242 | 67 | 33 | | 67 |
| 3 | " | 192 | 167 | 208 | 100 | 142 | 108 | 33 | | 67 |
| 4 | " | 167 | 100 | 233 | | 217 | 92 | 33 | 50 | 67 |
| 5 | " | 183 | 200 | 100 | 125 | 192 | 67 | 33 | 100 | 67 |
| 6 | undecided | 167 | 100 | 258 | 100 | 107 | 67 | 33 | 50 | 67 |
| 7 | " | 467 | 100 | 192 | 100 | 25 | 67 | 33 | | 67 |
| 8 | " | 50 | 275 | 217 | 75 | 142 | 108 | 33 | 75 | 67 |
| 9 | " | 183 | 217 | 258 | | 133 | 100 | 50 | | 67 |
| 10 | " | 142 | 250 | 83 | 50 | 175 | 167 | 33 | 100 | 67 |
| 11 | " | 208 | 117 | 167 | 75 | 192 | 67 | 33 | 100 | 67 |
| 12 | " | 208 | 100 | 108 | 50 | 242 | 108 | 33 | 100 | 67 |
| 13 | teaching | 408 | 117 | 167 | | 217 | 67 | 33 | | 67 |
| 14 | " | 283 | 50 | 117 | 25 | 75 | 283 | 50 | 50 | 67 |
| 15 | " | 233 | 217 | 117 | 75 | 217 | 67 | 33 | 50 | 67 |
| 16 | adv. study | 167 | 50 | 58 | 50 | 417 | 67 | 33 | | |
| 17 | " " | 217 | | 225 | 75 | 92 | 67 | 33 | 25 | 67 |
| 18 | medicine | 183 | 233 | 117 | 25 | 100 | 200 | 125 | 50 | 67 |
| 19 | " | 50 | 308 | 200 | 75 | 142 | 200 | | | 67 |
| 20 | engineering | 50 | 167 | 200 | 25 | 75 | 283 | 50 | 25 | 167 |
| 21 | " | 183 | 117 | 117 | | 192 | 67 | 50 | 50 | 233 |
| 22 | chemist | 183 | 50 | 58 | | 75 | 208 | 50 | 100 | 233 |
| 23 | M. I. T. (1) | 183 | 167 | 117 | 50 | 50 | 200 | | 75 | 183 |
| 24 | varnish | 183 | 117 | 333 | 75 | 192 | 150 | | | 67 |
| 25 | manufacturing | 50 | 167 | 183 | 25 | 192 | 250 | | | 142 |
| 26 | shoes | 50 | 267 | 167 | 150 | | 100 | 33 | | 58 |
| 27 | publishing | 167 | 150 | 200 | 50 | 283 | 125 | | 50 | 67 |
| 28 | library supplies | 167 | 167 | 175 | 125 | 133 | 67 | 33 | | 67 |
| 29 | broker | 117 | 117 | 133 | 75 | 142 | 192 | 33 | 50 | 67 |
| 30 | travel | 50 | 283 | 125 | 75 | 167 | | 33 | 125 | 67 |

1 M. I. T. equals "study at Mass. Inst. of Tech."

TABLE 75

YALE

| | | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. | Art, Mus. | Bible |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | law | 217 | 133 | 167 | 50 | 333 | | | | 50 | | |
| 2 | " | 100 | 167 | 167 | | 317 | | 33 | 100 | 50 | | a |
| 3 | " | 317 | 217 | | 100 | 167 | | 17 | 83 | 33 | 33 | |
| 4 | " | 50 | 50 | 150 | 67 | 517 | 50 | | 83 | 50 | | |
| 5 | " | | 167 | 200 | 50 | 417 | 150 | | | 50 | | |
| 6 | " | 50 | 50 | 200 | 83 | 467 | 50 | | 83 | 50 | | |
| 7 | " | | 267 | 267 | 50 | 367 | 50 | 17 | | 50 | | |
| 8 | " | 50 | 250 | 150 | 83 | 283 | | | 83 | 50 | | |
| 9 | " | 100 | 200 | 133 | 133 | 283 | 100 | | 33 | 50 | 33 | |
| 10 | " | 50 | 183 | 183 | 117 | 283 | 50 | | 33 | 67 | 17 | 50 |
| 11 | unknown | 50 | 133 | 183 | 83 | 333 | 150 | | 67 | | | |
| 12 | " | 50 | 100 | 200 | 67 | 250 | 183 | | 67 | 133 | | |
| 13 | " | 50 | 300 | 200 | 133 | 150 | 50 | 17 | | 100 | | |
| 14 | " | | 317 | 117 | 100 | 83 | 100 | 67 | 117 | 100 | 17 | |
| 15 | " | | 100 | 217 | 100 | 300 | 100 | | 67 | 100 | | |
| 16 | " | 367 | 267 | 83 | 117 | 100 | | 17 | 83 | | | |
| 17 | " | 233 | 200 | 17 | 50 | 367 | 100 | | | 133 | | |
| 18 | " | 17 | 50 | 233 | 183 | 367 | 100 | | 83 | 50 | | |
| 19 | " | 100 | | 183 | 217 | 233 | | | 100 | 17 | | 133 |
| 20 | " | 350 | 183 | 167 | 83 | 150 | | | 117 | | | |
| 21 | " | 200 | 100 | 133 | 67 | 317 | | 17 | 100 | | | 50 |
| 22 | " | | 283 | 250 | 33 | 317 | | 17 | 83 | 17 | | |
| 23 | " | 367 | 233 | 167 | 50 | 83 | 50 | | | 50 | | b |
| 24 | " | | 100 | 150 | 83 | 467 | 100 | | 83 | 50 | | |
| 25 | " | 150 | 133 | 267 | 100 | 183 | 50 | 17 | 33 | 50 | 33 | |
| 26 | " | 133 | 150 | 100 | 83 | 317 | 50 | 17 | 83 | 50 | 17 | |
| 27 | " | 50 | 183 | 200 | 50 | 183 | 183 | | 33 | 100 | | |
| 28 | " | 200 | 100 | 167 | 133 | 283 | | 17 | 83 | | 17 | |
| 29 | " | 100 | 250 | 100 | 167 | 217 | | | 83 | | 33 | 50 |
| 30 | " | 150 | 100 | 217 | 167 | 250 | 100 | | 33 | | | |
| 31 | " | 50 | 333 | 150 | | 300 | 100 | 17 | | 50 | | |
| 32 | " | | 333 | 150 | 100 | 247 | 100 | | 50 | 50 | 33 | |
| 33 | " | | 250 | 183 | 167 | 150 | 50 | 17 | 67 | 50 | | |
| 34 | " | 100 | 100 | 167 | 50 | 150 | 183 | | 67 | 233 | | |
| 35 | " | 150 | 133 | 150 | 100 | 350 | | 17 | 83 | | | 50 |
| 36 | " | 233 | 67 | 83 | 100 | 333 | 100 | 17 | | 100 | | |
| 37 | " | 233 | 50 | 200 | 33 | 433 | | | 83 | | | 50 |
| 38 | " | | 50 | 150 | 67 | 467 | 100 | 17 | 117 | 50 | | 50 |
| 39 | " | 117 | 167 | 283 | 50 | 350 | | 17 | 100 | 17 | | |
| 40 | teaching | 233 | 200 | 167 | 100 | 167 | 50 | 17 | 33 | 50 | | |
| 41 | " | 200 | 283 | 183 | 117 | 217 | 50 | | | 50 | | |
| 42 | " | 17 | 183 | 267 | 117 | 83 | 250 | 67 | | 33 | 17 | |
| 43 | literature and education | 100 | 267 | 250 | 100 | 167 | 50 | | 83 | | | |
| 44 | publishing | 50 | 183 | 233 | 83 | 267 | 100 | 17 | 67 | | | |
| 45 | medicine | | 233 | 233 | 167 | 183 | 100 | 17 | 33 | 67 | 17 | |
| 46 | " | 100 | 133 | 217 | | 250 | 150 | 67 | 33 | 50 | | |
| 47 | " | | 150 | 300 | 83 | 267 | 50 | 17 | 33 | 50 | 17 | 50 |
| 48 | medical missionary | 100 | 150 | 167 | | 167 | 200 | 117 | 50 | 50 | | |

a = Archæology 67. b = Archæology 33.

TABLE 75

YALE (*continued*)

| | | Anc. Lan. | Mod. Lan. | English | Phil., etc. | Hist., etc. | Ph. Chem. | Biol. Sci. | Other Sci. | Math. | Art, Mus. | Bible |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 49 | ministry | 183 | 50 | 117 | 133 | 350 | | | 117 | | | 217 |
| 50 | " | 100 | 150 | 117 | 150 | 150 | 50 | | 50 | | | 283 |
| 51 | " | 150 | 100 | 300 | 117 | 100 | 50 | | | 50 | | 150 |
| 52 | " | 283 | 183 | 133 | 83 | 183 | 50 | | 33 | 100 | | |
| 53 | missionary | 50 | 100 | 183 | 100 | 317 | 100 | 17 | 33 | 50 | | 50 |
| 54 | " | 117 | 150 | 200 | 100 | 250 | 100 | 17 | 33 | 50 | | |
| 55 | journalism | 267 | 317 | 133 | 100 | 83 | 50 | | 33 | 100 | | |
| 56 | " | 233 | 200 | 183 | 50 | 217 | | | 83 | | 33 | |
| 57 | " | 100 | 50 | 167 | 17 | 550 | | | 100 | 50 | 17 | |
| 58 | banker | | 300 | 217 | 33 | 267 | 50 | 17 | 83 | 50 | | |
| 59 | " | 83 | 133 | 283 | 50 | 250 | | 17 | 133 | 50 | | |
| 60 | " | 50 | 183 | 233 | 67 | 367 | | 17 | 83 | 50 | | |
| 61 | " | 100 | 150 | 217 | 33 | 400 | | | 100 | | | |
| 62 | bonds | 100 | 150 | 167 | 83 | 250 | 50 | 17 | 83 | 100 | | |
| 63 | broker | | 133 | 200 | 117 | 350 | 50 | 17 | 100 | 17 | 17 | |
| 64 | " | 150 | 150 | 167 | 50 | 333 | | 17 | 133 | 50 | | |
| 65 | " | 133 | 200 | 100 | 117 | 317 | | 17 | 100 | | 17 | 83 |
| 66 | " | 83 | 133 | 67 | 83 | 383 | 50 | | 33 | 33 | 33 | |
| 67 | steel (or bonds) | 150 | 50 | 283 | 50 | 233 | 50 | 17 | 100 | 50 | 17 | |
| 68 | broker | 150 | 50 | 250 | 83 | 300 | | | 133 | | 17 | |
| 69 | life ins. | 50 | | 250 | 133 | 433 | 83 | 17 | 50 | 50 | | |
| 70 | geol. | | 50 | 117 | 33 | 200 | 183 | 50 | 267 | 117 | | |
| 71 | arch. | 100 | 350 | 117 | | 150 | 100 | | | 133 | 67 | |
| 72 | " | 83 | 167 | 217 | | 333 | | 17 | 100 | 50 | 33 | b |
| 73 | florist | 100 | | 150 | 117 | 300 | 150 | 117 | 83 | | | |
| 74 | consul | 50 | 117 | 83 | 117 | 467 | | | 100 | 33 | | b |
| 75 | lumber | 50 | 33 | 200 | 67 | 500 | 50 | 17 | 83 | | | |
| 76 | " | 50 | 250 | 250 | 100 | 217 | 100 | 17 | | | | |
| 77 | oil | 50 | 100 | 183 | 100 | 400 | | 17 | 117 | 33 | | |
| 78 | manufacturing | | 183 | 250 | 50 | 350 | 50 | 17 | 83 | 50 | | |
| 79 | " | 50 | 150 | 283 | 50 | 383 | 50 | | 100 | 50 | | b |
| 80 | " | 50 | 250 | 100 | 50 | 250 | 100 | | 33 | 167 | | |
| 81 | " | 133 | 150 | 183 | | 400 | | 17 | 17 | 100 | | |
| 82 | " | 250 | 100 | 117 | 117 | 350 | | 17 | 83 | | | b |
| 83 | " | | 100 | 250 | 100 | 233 | 100 | 17 | 50 | 50 | | |
| 84 | " | 100 | 350 | 50 | 50 | 167 | 150 | | 33 | 100 | | |
| 85 | " | 267 | 67 | 267 | 50 | 317 | 33 | 17 | 83 | | | |
| 86 | " | 100 | 100 | 167 | 100 | 267 | 100 | 17 | 67 | 67 | | |
| 87 | business | 200 | 50 | 117 | 183 | 350 | | | 100 | | | |
| 88 | " | 100 | 50 | 217 | 100 | 383 | | 17 | 83 | 50 | | |
| 89 | " | 100 | 133 | 217 | 167 | 233 | 50 | | 83 | 33 | | |
| 90 | " | 100 | 233 | 100 | 33 | 367 | 50 | 33 | 40 | 50 | | |
| 91 | " | | 150 | 250 | 117 | 317 | | 17 | 100 | 50 | 17 | |
| 92 | " | 50 | 183 | 233 | 83 | 317 | 50 | 17 | | 50 | | |
| 93 | railroad | 200 | 67 | 217 | 67 | 317 | 50 | | 83 | | | |
| 94 | " | | 317 | 50 | | 167 | 300 | 17 | | 167 | | |
| 95 | steamship | 100 | 133 | 250 | 33 | 283 | 50 | 17 | 100 | | | b |

b=Archæology 33.

In the case of which group of studies—(a) the languages and literatures, (b) the science of human affairs and (c) the natural sciences—does the amount of study bear the lowest ratio to the significance of the study for modern civilization? What evidence is there that the accidental dominance of some personal view has made certain departments specially strong or has framed regulations requiring certain studies far more than is usually the case and so has led to a notably larger attention to one or another study in the one institution than is given to it by students in general?

I note here two samples of the facts which the reader can get in response to such questions:

Thus, Table 76 gives certain objective measures of the frequency of notable *specialization* in the case of these students.

TABLE 76

SPECIALIZATION

PERCENTAGES WHICH THOSE SPENDING OVER HALF OF THEIR COURSE FOR THE A. B. DEGREE IN STUDYING CERTAIN GROUPS OF SUBJECTS ARE OF THE TOTAL NUMBER ATTAINING THE A. B. DEGREE

| | Lang. and Lit. | Social. Hist. Econ. Gov. | All Natural Sciences | Engineering | Medicine | Architecture |
|---|---|---|---|---|---|---|
| Bowdoin | 61 | | 6 | | | |
| Columbia | 24 | | | 10 | 10 | 5 |
| Cornell | 14 | 10 | 17 | | see note a. | |
| Harvard | 32 | 16 | 6 | 2 | | |
| Princeton | 31 | | | | | |
| Stanford | | 5 | 20 | 25 | see note a. | |
| Wellesley | 55 | | 5 | | see note b. | |
| Wesleyan | 53 | | | | | |
| Williams | 38 | | | | | |
| Yale | 26 | 3 | 1 | | | |

(a) If the combination of the "hist. econ. gov." group with law is counted as one group, and if the combination of science and medicine is counted as one group, we have added 40% at Stanford, and 70% at Cornell, of the former sort of specialization; and 12% at Cornell of the latter sort.

(b) One case, 5%, for music and art.

The above data of Table 76 give evidence (1) that specialization toward a profession will occur when it is permitted, as at Stanford, Columbia and Cornell; (2) that free election (but within non-professional courses) increases specialization outside of languages and literatures (Harvard); (3) that, in the other colleges, specialization by candidates for the A. B. degree is chiefly in languages and literatures, a specialization artificially cultivated by the requirements in these subjects for entrance and graduation. The student is far less able to find out in the secondary school his interests and abilities in the sciences of nature and human affairs and, save at Harvard, is less free to devote much time to them in colleges.

As a sample measurement of the extent of apparent "*scattering*" we may take for each college the percentage of graduates who did not devote at least one fifth of the total degree requirement to any one of the following: (1) Ancient language, (2) Modern foreign languages, (3) English, (4) Philosophy, etc. (5) History, (6) Economics, (7) Government and public law, (8) Physics and chemistry, (9) Biological science, (10) Other natural sciences, (11) Mathematics, (12) Art and music, (13) Education, (14) Law, (15) Medicine, (16) Engineering, (17) Architecture.

The percentages are given in Table 77.

TABLE 77

THE FREQUENCY OF "SCATTERING"

| | |
|---|---|
| Bowdoin | 0 |
| Columbia | 0 |
| Cornell | 0 |
| Harvard | 12 |
| Princeton | 46 |
| Stanford | 0 |
| Wellesley | 0 |
| Wesleyan | 8 |
| Williams | 5 |
| Yale | 7 |

Of these cases of apparent diffusion over half are individuals each giving three tenths of the degree requirement to history, economics, government and public law; many of the others represent conceivably closely related work (*e. g.* of the six Harvard cases, Nos. 10, 26, 28 and 50).

# PART IV

# STUDIES OF SCHOOL ACHIEVEMENTS

## § 18. Means of Measuring Educational Products

Any educational effect or achievement is a change in some individual or group. Such a change is demonstrated by the attainment of some condition or status known not to have existed prior to the action of the educational force in question. It is measured by the comparison of the condition without and that with the action of the force. We prove the existence of and measure changes in human beings as elsewhere by comparing two static conditions.

These conditions are known to us only by their objective manifestations, their productions of observable facts, sums done, books read, lies not told, illness not suffered, and so on through the endless list of facts produced or prevented.

Observation of an individual's life leads us to define and measure his condition or status in any particular in one of two ways, either (1) as an amount of some thing or quality or power, or (2) as a position in comparison with the conditions of other men.

Thus a boy, in penmanship, may be measured (1) as writing a "barely legible" hand, or (2) as being next to the worst boy of a hundred of his age. Thus a girl, in knowledge of the German language, may be measured as (1) able "to read easy German at sight" and as knowing a certain 1600 words, a certain 120 constructions and a certain system of forms, or (2) as having the best acquaintance with German of any first year student.

That a pupil can "add and subtract with integers," or can "read words of one syllable," or can cook edible bread—these are all measurements by the absolute amount of something, however vaguely and crudely the amount is defined. That a pupil is a "good student," or that he was graded "excellent" in history, or that a man of science is in the upper five hundred of the Cat-

tell list, or that a poet is "eminent"—these are all measurements by relative position.

Educational measurements of the former sort can be improved by defining exactly and objectively what is meant by any given measure so that we can all mean the same thing by it, and by getting aids to convenient and precise identification of any condition or status as equivalent to some exactly defined measure.

Educational measurements of the latter sort can be improved by defining the relative positions—*e. g.* as 29th from the top of 1000—and by defining the group in relation to which the fact is placed—*e. g.* as twelve-year-old children in New York City in 1910, or as compositions written in the first year of high school in an hour's time without preparation or assistance, or as "the thousand most eminent men of science in America."

Educational measurements of the latter sort, though of great value when properly treated, are essentially inferior to those of the former sort. Other things being equal, reference to some objective scale or series of standard amounts of the thing in question, is much preferable to reference to a given place in a total series of miscellaneous samples of the thing. And one chief task of the science of education is to work out units and scales for educational forces and products as the physical sciences have done for mass, temperature, work, electrical potential, electrical energy, and the like.

As a sample of the methods and results of such studies of the means of measuring educational achievement, I quote from a monograph on Handwriting by one of the present authors.

### *The Construction of a Scale for Quality of Handwriting in the case of Children in Grades 5 to 8*

If one selects from children's written work 1000 samples ranging from the best to the worst handwriting found in grades 5 to 8

and tries to rank these 1000 samples in order of merit for handwriting, one finds that he cannot make 1000 such ranks. Some of the handwritings will be indistinguishable in "goodness" or "quality" or "merit." Nor can one make 100 such ranks. Nor can one make 40. One can make about 20, but if he so ranks the samples a number of times he gets substantially the same average result as he gets when he ranks them a number of times in 10 or 11 groups. To get an individual's judgment of the relative merits of the 1000 samples it is sufficient to have him rank them in 10 or 11 groups three or four times. If he grades in 10 groups and tries to make the differences in "goodness" or "quality" or "merit" all equal—to make, that is, the sample he puts in the highest group (call it 11) as much superior to those in the next highest group (call it 10) as the latter are to those he puts in the second from the highest group (call it 9), etc., etc.—we have in the average[1] result of his groupings his judgment of the relative merits of the samples in a specially convenient form. For instance, if he grades sample 217 as in group 5 three times, as in group 4 once, and as in group 6 once, and grades sample 218 as in group 6 three times, in group 5 once and in group 7 once, he judges 218 to be "1" better than 217, "1" being, in the individual's judgment, one tenth of the difference between group 1 and group 11.

If thirty or forty individuals chosen from competent judges of handwriting thus judge the 1000 samples, the average[1] of all their gradings of a sample, gives approximately its relative merit in the judgment of competent judges in general. If they grade sample 317 in group 3 two times, in group 4 five times, in group 5 thirteen times, in group 6 thirteen times, in group 7 five times, and in group 8 two times, their average or median grade for it is 5.5. If their average or median grade for sample 318 is 6.4, they esteem 318 as .9 better than 317. The .9 means, in their judg-

[1] Except for certain factors which will be described on page 226.

ment, nine tenths of one tenth of the difference between grade 1 and grade 11.

If now from all the 1000 samples we could find some which were graded exactly 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11, by the average or median [1] judgment of 30 or 40 competent judges, each grading the set into groups 1 to 11 by what he thinks are equal steps in merit, we would have a very useful scale of merit in handwriting. It would include all grades from the worst to the best and would proceed by what were, by the average competent opinion, equal steps. Or, if we could find some graded 1.5, 2.4, 3.3, 4.2, 5.1, 6.0, 6.9, 7.8, 8.7, 9.6, and 10.5, we would have a scale nearly as useful. It would not be so likely to include the very worst and very best samples, but would proceed by equal steps, as before.

The scale which I shall proceed to describe was obtained by a method in principle the same as the above.

Such a scale could be got in a different way, as follows: Suppose competent judges to compare each sample with every other, stating in each case which was better. If then we picked out samples a, b, c, d, etc., such that a was judged better than b just as often as b was judged better than c, and just as often as c was judged better than d, and so on, we would have, in samples a, b, c, d, etc., a scale by equal steps, if two other conditions were fulfilled by them. The first of these conditions would be that a should not be judged better than b and worse than b *equally* often. For it if were, a would be equal to b, b to c, c to d, and so on, and we would have no extent to our scale. The second of these conditions would be that a should not *always* be judged better than b. For, if it were, it might be just enough better to barely be so judged, or it might be very, very much better.

Only if differences are not always noticed can we say that

[1] Except for certain factors which will be described on page 226.

differences equally often noticed are equal. But if we had, as a result of the judgments, facts like those below, we could say that a, b, c, d, etc., represented samples of writing progressing by equal steps of difference in quality.

1000 comparisons of a, b, c, d, etc., being made:

a was judged better than b in 73 per cent, equal to b in 11 per cent, and worse than b in 16 per cent of the judgments.

b was judged better than c in 73 per cent, equal to c in 11 per cent, and worse than c in 16 per cent of the judgments.

c was judged better than d in 73 per cent, equal to b in 11 per cent, and worse than b in 16 per cent of the judgments, and so on for d-e, e-f, . . . . . n.

The scale which I shall describe was tested throughout by this second method. The two methods do not give results that correspond exactly. The variations follow this rule: Judges will notice differences between poor samples when they compare them directly one with another which they would not count in rating them by a mental scale. For example, suppose samples a, b, c and d to be rated 10, 9, 3, and 2 by comparison with a mental scale of eleven grades by equal steps. The percentage of judges regarding 10 as better than 9 will be smaller than that regarding 3 as better than 2.

Since we get two different scales by the two methods, there are four alternatives. We may adopt one or the other or combine them, or give the results by both methods. I shall take the latter alternative, but shall at this point present only the scale as derived by the first method.[1]

The scale given here is then a scale in which the steps of difference are equal in the sense of being called equal by competent judges. Equal will mean just this in the following discussion.

[1] For the scale as derived by the second method see Section 12 of The Teachers' College Record, March, 1910.

### *The Nature of the Scale*

Pages 213 to 222 contain or rather *are* the upper part of the scale for merit of the handwriting of children of grades 5 to 8. . . . Each set of samples represents a point on this scale. The samples on page 213 are of quality 18 and 17; the samples on page 214 are of quality 16; the samples on pages 215 and 216 are of quality 15; and so on, as far as quality 11. I show also quality 5 (on page 223) and the quality chosen as approximately zero (on page 224).

The use of 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 for these qualities of handwriting means, first of all, that 14 is as much better than 13, as 13 is than 12; that 13 is as much better than 12, as 12 is than 11, and so on. In the second place it means that quality 14 is two times as far above 0 merit in handwriting as quality 7 is; that quality 16 is twice as far above 0 merit in handwriting as quality 8 is, and so on. Zero merit is defined roughly as writing as bad as sample 140 (see page 224), as a handwriting, recognizable as such, but of absolutely no merit as handwriting. The use of several samples under one quality means that those samples are of equal merit. The full scale[1] includes samples of as many different styles as could be obtained, so that in using the scale the merit of any sample of any style of writing can be quickly ascertained by comparison with the scale. The full scale also extends in actual samples by children from nearly the worst writing[2] of fourth-grade children (quality 5) to nearly the best writing of eighth-grade children (quality 17). The scale thus extends from a quality, better than which no pupil is expected to produce, down to a quality so bad as to be intolerable, and probably almost never found, in school practice in the grammar grades.

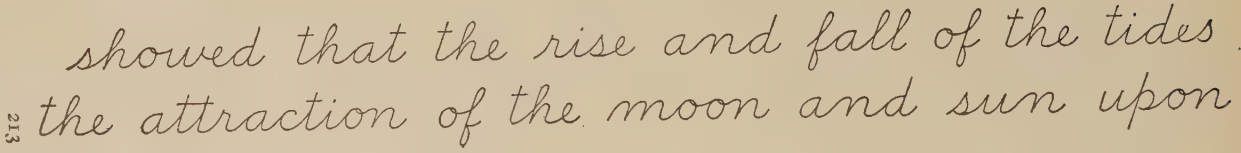
[1] For the complete scale, see The Teachers College Record, March, 1910, in p. 11 ff.

[2] In a formal exercise in writing at their "natural" rate.

## A Scale for Handwriting of Children in Grades 5–8

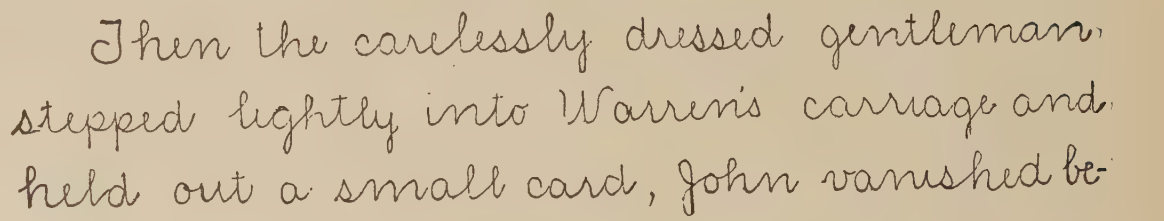
The Unit of the Scale Equals approximately One-Tenth of the Difference between the Best and Worst of the Formal Writings of 1,000 Children in Grades 5–8. The Differences 16–15, 15–14, 14–13, etc. Represent Equal Fractions of the Combined Mental Scale of Merit of from 23 to 55 Competent Judges.

Quality 18. Sample 125






Quality 17. Sample 141


Then the carelessly dressed gentleman
stepped lightly into Warren's carriage and
held out a small card, John vanished be-

Quality 16. Samples 32 and 84

Then the carelessly dressed gentle-
man stepped lightly into Warren's
carriage and held out a small



gentlemen stepped lightly into
Warren's carriage and held out
a small card, John vanished

Quality 15. Samples 49 and 89

lightly into Warren's carriage and held out a small card. John vanished behind the bushes and the carriage moved along down the drive



held out a small card, John vanished behind the bushes and the carriage moved along down the driveway. The audience of passers-

Quality 15. Samples 47 and 96

Then the carelessly dressed gentle-
man stepped lightly into Warrens
carriage and held out a small white



John vanished behind the bushes
and the carriage moved along
down the driveway. The audience

Quality 14. Samples 54 and 19

Then the carelessly dressed gentlemen stepped lightly into Warren's carriage and held out a small card, J

Then the carelessly dressed gentleman stepped lightly into Warrens carriage and held out a small card, John vanished behind

Quality 13. Samples 55 and 24

Then the carelessly dressed gentleman stepped lightly into Warren's carriage and held out a



rushed behind the bushes and the carriage moved along down the driveway. The audience of passers-by which had

Quality 13. Samples 4 and 26

Then the carelessly dressed gentlemen stepped lightly into Warren's carriage and



Then the carelessly dressed gentleman stepped lightly into Warren's carrige and

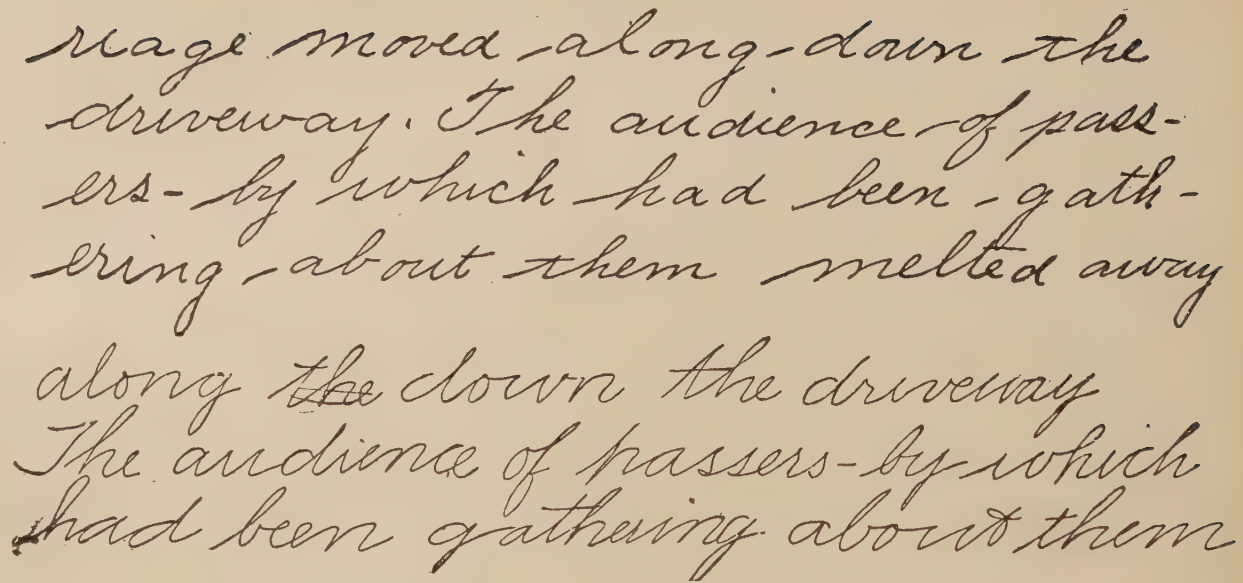
behind the bushes and the carriage moved
along down the driveway. The audience
of passers-by



Then the carelessly dressed gentlemen stepped
lightly into Warren's carriage and held out a small
card, John vanished behind the bushes and the

Quality 12. Sample 30

lightly into Warren's carriage and held out a
small card, John vanished behind the bushes
and the carriage moved along down the drive-



riage moved along down the
driveway. The audience of pass-
ers-by which had been gath-
ering about them melted away

along ~~the~~ down the driveway
The audience of passers-by which
had been gathering about them

John vanished behind the
bushes and the carriage
moved along down the
driveway The audience

Quality 5. Sample 6

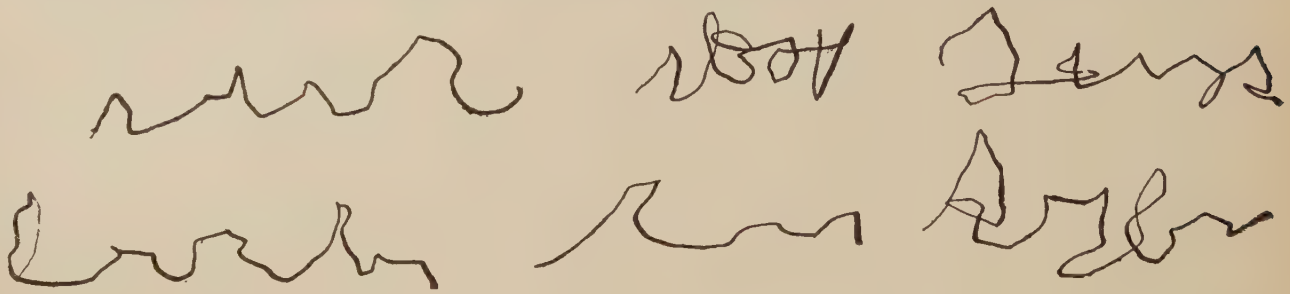
bushes and the carriage



swerved along down the

driveway. He and

Sample 140, representing zero merit in handwriting. Zero merit is arbitrarily defined as that of a handwriting, recognizable as such, but yet not legible at all and possessed of no beauty.



If one had a finer scale, its use would give but slightly more accurate results, and would require more practice and more time.

Any specimen of handwriting is measured by this scale by putting it alongside the scale, as it were, and seeing to what point on the scale it is nearest. If one wishes to measure more finely than to units, he can add or subtract a fraction according as the sample to be measured seems better or worse than the quality of the scale to which it is nearest.

The sample to be measured should, for convenience, be examined with the entire scale in view. If the scale's samples are arranged in order on a table or against a wall, the examined sample is easily compared with them. The measurer then decides what quality of the scale the sample possesses and records the measure. The measurer should be, of course, careful not to decide its grade because of its likeness in *style*, but only because of its likeness in *quality* to some sample of the scale. If, for instance, one has a pronounced vertical that is really of quality 18, one must not call it quality 17, because it is in style more like sample 141 than like the sample of quality 18. The measure may be made more and more accurate by having other judges also measure, each always in ignorance of the ratings given by the others. In default of other judges, the measure may be made more accurate by rating the sample two or three times, each time in ignorance of the ratings previously given. An individual may be measured more accurately by using several samples of his writing, each being rated in ignorance of the ratings given to the other samples.

### *The Derivation of the Scales*

I shall give here only such notes as are likely to be helpful to any one who is stimulated by this scale to construct similar scales for other educational products. The principles stated here for

a scale for merit in handwriting are valid for other educational products as well.

To construct a scale by which to measure various qualities (that is, amounts of merit) in handwriting ranging from, say, $x$ to $x+y$, it is desirable to have samples of quality, not only of every degree from $x$ to $x+y$, but also of qualities worse than $x$ and of qualities better than $x+y$. The reason is that otherwise the exact values of samples at $x$ or $x$ plus a slight amount and samples at $x+y$ or $x+y$ minus a slight amount cannot be directly measured, but only inferred.

For example, call $x$ 1 and $y$ 10. $X+y$ then being 11, $x$ or 1 is nearly the worst and $x+y$ or 11 is nearly the best of a series of samples, ranging continuously from $x$ to $x+y$.

If now any one is required to fix in mind 11 points including $x$ (or 1) and $x+y$ (or 11) differing each from the next by equal amounts, and to rate each of the samples as 1, 2, 3,—9, 10, or 11, according to which of these mentally fixed points it seems most like, he can err by rating a sample as 2 or 3 when it is really 1, but cannot err by rating it 0 or minus 1 when it is really 1. Similarly he can err by rating it 9 or 10 when it is really 11, but cannot err by rating it 12 or 13.

Unless the set of samples to be rated includes some samples, one, two, three, and even four grades better than the best quality ($x+y$) to be represented in the final scale and also some samples one, two, three grades worse than the worst quality ($x$) to be represented in the final scale, one cannot get the values of $x+y$ and $x$ themselves save by inference.

Hence, to make a scale for the handwritings of, say, 10-year-old school children conveniently, it is necessary to have a collection of samples varying in quality from much below the worst to much above the best of their writings. This involves the use of "unnatural" samples, which may seem very objectionable, but which as a matter of fact does little or no harm.

In the case of a scale for the merit of English compositions by high school pupils one should start from a collection of compositions ranging by small gradations from compositions much worse than the worst point on the final scale is to be, to compositions much better than the best point on the final scale is to be. Here the extremely bad ones may be obtained by artificial construction, from the feeble-minded, or from very old and stupid grammar school children. The extremely good ones may be obtained from the printed or manuscript compositions in youth by gifted authors.

To get samples exactly situated at points differing progressively by equal steps requires that the original set range from one extreme to the other by very slight gradations. This means for practical purposes that one must have at the start a very large number of samples. After these have been graded by enough judges to rate each roughly, only those which are near the points to be represented by the scale need be graded further. As the value of each sample of this narrower selection is determined more exactly by further judgments, only those very near the points to be represented on the final scale need be preserved for still further judgments; and so on till the values of enough samples are determined to the degree of precision required for the scale itself.

Points on the scale exactly determined, but not at progressively equal steps, can be got with far less labor. If, for example, after a single rating I had picked samples at intervals from the best to the worst and then had only these few samples rated by the twenty to seventy judges, the value of each could have been stated nearly as exactly as is the case on the samples of the scale. But there would form a series like 17.33, 16.65, 16.28, 15.82, 15.40, 15.47, 15.23, 14.95, 14.7, etc., instead of the approximate 17, 16, 15, 15, 15, 15, 15, 14, 13, 13, 13, etc., of the scale. They would have served the purpose of a scale as well so far as aiding an ob-

server to make exact measurements which any other observer could verify, and to report them unambiguously, but the labor of allowing for the decimal values or of computing measures expressed in awkwardly long numbers would burden each person using the scale. If the scale were designed for use only by scientific investigators of education, I should have economized in respect to the number of samples rated, had far more ratings of each sample, and presented a scale of very exactly determined qualities but at irregular intervals. For the common use of pupils, teachers, and supervisory officers a less precise scale by approximately equal steps seemed far more valuable.

It is possible that the determination of the amount of difference between their median values by the percentage of judges noticing the difference is preferable to the determination by the amount of difference between the median values, as given by judges attempting to apply to each a scale of mentally equal differences. I used both methods.

In general, the experience in constructing this scale gives great encouragement to the hope that for many educational facts, units and scales may be invented that shall enable us to think quantitatively in somewhat the same way that we can about facts of physics, chemistry, or economics. It has been commonly supposed that the great complexity of such facts as examination papers in spelling, manifestations of interest in history, acts of moral significance, habits of industry, essays, poems, inventions, replies to questions demanding logical inferences, and other like results of education, prevents the samples composing any one such group from being measured by any one linear scale at all comparable to a foot rule or thermometer or galvanometer.

It is true that some judges find it hard to judge handwriting for the complex of legibility, beauty, ease, "character," etc., into which "quality" or "goodness" or "merit" resolves itself. But none of them found it impossible to do so, and most of them rated

the writing for the complex—"merit or goodness in your opinion," as readily as an appraiser would rank articles of sale by money price, or as a little child would arrange pieces of paper in the order of their size regardless of the fact that some were squares, some circles and some triangles.

The entire history of the judgments of the merit of handwriting supports the claim that if a number of facts are known to vary in the amount of anything which can be thought of, they can be measured in respect to it. Otherwise, I may add, we would not know that they varied in it. Wherever we now properly use any comparative, we can by ingenuity learn to use defined points on a scale.

Further acquaintance with the procedure by which a scale for the measurement of any objective educational product may be derived from a sufficient number of ratings by expert judges may be had by reading Dr. M. B. Hillegas' account of "A Scale for the Measurement of Quality in English Composition by Young People" (Teachers' College Record, Sept., 1912). By the voice of forty experts Sample 580 is regarded as of zero or "just not any" merit as English writing by a young person in his 'teens.

**Quality 0.**

*580. Letter*

Dear Sir: I write to say that it aint a square deal Schools is I say they is I went to a school. red and gree green and brown aint it hito bit I say he don't know his business not today nor yeaterday and you know it and I want Jennie to get me out.

Sample 595 is judged to be better than sample 580 by 89.1 per cent of competent judges (202 in number) and so, by virtue of a theory of the distribution of judgments well known to psychologists, is recorded as differing from sample 580 by 1.83 times the

P. E. (the amount of difference which 75 per cent of the judges would discriminate correctly).

**Quality 1.83**

*595. My Favorite Book*

the book I refer to read is Ichabod Crane, it is an grate book and I like to rede it. Ichabod Crame was a man and a man wrote a book and it is called Ichabod Crane i like it because the man called it ichabod crane when I read it for it is such a great book.

Sample 618 is judged to be better than sample 595 by 69.8 per cent of the judges and so, by virtue of the theory just referred to, is recorded as differing from 595 by .77 times the P. E.; and consequently as differing from zero (sample 580) by 1.83 P. E.+.77 P. E., or 2.60 P. E.

**Quality 2.60**

*618. The Advantage of Tyranny*

Advantage evils are things of tyranny and there are many advantage evils. One thing is that when they opress the people they suffer awful I think it is a terrible thing when they say that you can be hanged down or trodden down without mercy and the tyranny does what they want there was tyrans in the revolutionary war and so they throwed off the yok.

Sample 94 is judged to be better than sample 618 by 76.7 per cent of the judges, and so is recorded as differing from sample 816 by 1.09 P. E.; and consequently as differing from the zero of the scale by 1.83 P. E.+.77 P. E.+1.09 P. E., or 3.69 P. E.

**Quality 3.69**

*94. Sulla as a Tyrant*

When Sulla came back from his conquest Marius had put himself consul so Sulla with the army he had with him in his conquest

seized the government from Marius and put himself in consul and had a list of his enemys printy and the men whoes names were on this list we beheaded.

So we have as a scale so far:

Sample 580 as 0
" 595 " 1.83
" 618 " 2.60
" 94 " 3.69

In a similar way Sample 519 is assigned a value of 4.74; sample 534, a value of 5.85; sample 196, a value of 6.75; sample 221 a value of 7.72; and so on for the balance of the scale not presented here.

### *519. De Quincy*

First: De Quincys mother was a beautifuul women and through her De Quincy inhereted much of his genius.

His running away from school enfluenced him much as he roamed through the woods, valleys and his mind became very meditative.

The greatest enfluence of De Quincy's life was the opium habit. If it was not for this habit it is doubtful whether we would now be reading his writings.

His companions during his college course and even before that time were great enfluences. The surroundings of De Quincy were enfluences. Not only De Quincy's habit of opium but other habits which were peculiar to his life.

His marriage to the woman which he did not especially care for.

The many well educated and noteworthy friends of De Quincy.

### *534. Fluellen*

The passages given show the following characteristic of Fluellen: his inclination to brag, his professed knowledge of History, his complaining character, his great patriotism, pride of his

leader, admired honesty, revengeful, love of fun and punishment of those who deserve it.

### *196. Ichabod Crane*

Ichabod Crane was a schoolmaster in a place called Sleepy Hollow. He was tall and slim with broad shoulders, long arms that dangled far below his coat sleeves. His feet looked as if they might easily have been used for shovels. His nose was long and his entire frame was most loosely hung to-gether.

### *221. Going Down with Victory*

As we road down Lombard Street, we saw flags waving from nearly every window. I surely felt proud that day to be the driver of the gaily decorated coach. Again and again we were cheered as we drove slowly to the postmasters, to await the coming of his majestie's mail. There wasn't one of the gaily bedecked coaches that could have compared with ours, in my estimation. So with waving flags and fluttering hearts we waited for the coming of the mail and the expected tidings of victory.

When at last it did arrive the postmaster began to quickly sort out bundles, we waited anxiously. Immediately upon receiving our bundles, I lashed the horses and they responded with a jump. Out into the country we drove at reckless speed—everywhere spreading like wildfire the news, "Victory!" The exileration that we all felt was shared with the horses. Up and down grade and over bridges, we drove at breakneck speed and spreading the news at every hamlet with that one cry "Victory!" When at last we were back home again, it was with the hope that we should have another ride some day with "Victory."

## § 19. School Achievement in Arithmetic

Dr. C. W. Stone ['08] in his study of " Arithmetical Abilities and Some of the Factors Determining Them " made a study of arithmetical achievements of children in the sixth grade in twenty-six school systems. This investigation evaluated the results secured not only in the fundamental operations but also in reasoning. All of the tests were given by Dr. Stone himself under conditions as nearly identical as was possible. Great care was taken in securing the results as will appear from the following discussion and table.

"The scores for the reasoning problems were determined from the result of two preliminary tests—one, giving one hundred sixth grade pupils all the time they needed to do the problems as well as they could in the order as printed; and another, giving one hundred sixth grade pupils all the time they needed to do problems as well as they could in the *reverse* order from that as printed. The results as tabulated below in Table 78 show that scores for reasoning problems of Grade-six pupils can be very definitely arranged in a scale on the basis of relative difficulty. Just what the scale should be can only be determined by determining the form of distribution and the location of the zero point. From what is known of these the scale of weighting shown in the last column of Table 78 is believed to be the best, and this is the one employed in the computations of this study. . . ."

". . . . In both reasoning and fundamentals the scores used as a measure of the achievement of a system were computed by combining the scores of one hundred pupils. Where more than one hundred pupils were tested, the papers used were drawn at random, the number drawn from each class being determined by the ratio of its number to the total number tested in the system.

Where less than one hundred pupils were tested, the combined scores made were raised to the basis of one hundred pupils."

TABLE 78

PRELIMINARY TESTS IN ARITHMETIC

REASONING—UNLIMITED TIME

100 DIFFERENT PUPILS TESTED EACH TIME

| Number of Problems | % Reasoned Correctly as Printed | % Reasoned Correctly as Reversed | Average % Reasoned Correctly | Weight According to Average % Correct | Weight Used as Probably the Best |
|---|---|---|---|---|---|
| 1 | 95 | 92.6 | 93.8 | 1 | 1 |
| 2 | 86 | 82.2 | 84.1 | 1.1 | 1 |
| 3 | 94 | 89 | 91.5 | 1 | 1 |
| 4 | 80 | 83 | 81.5 | 1.15 | 1 |
| 5 | 88 | 86 | 87 | 1.1 | 1 |
| 6 | 69 | 57.4 | 63.2 | 1.5 | 1.4 |
| 7 | 70 | 80 | 75 | 1.25 | 1.2 |
| 8 | 29 | 44 | 36.5 | 2.6 | 1.6 |
| 9 | 19 | 15.5 | 17.2 | 5.45 | 2 |
| 10 | 24 | 27.4 | 25.7 | 3.6 | 2 |
| 11 | 17 | 7.5 | 12.3 | 7.6 | 2 |
| 12 | 7 | 16.4 | 11.7 | 8 | 2 |

*Precautions Observed to Make the Scoring Accurate*

"The simplicity of the tests made the scoring comparatively easy, and with the observance of the following precautions it is believed that a high degree of accuracy was attained. (1) In so far as practicable, all the papers were scored by a single judge—only two persons being employed on any phase of the work for the entire twenty-six systems; (2) each problem was scored through one hundred or more papers, then the next followed through, etc.; (3) the score for each part of each problem, the errors, etc., were entered on a blank provided with a separate column for each item; (4) where there was doubt as to how the score should be made, the scorer made a written memorandum

of how the case was finally decided and this memorandum served as the guide for all future similar cases."

### *What the Scores Measure*

"As used in this study the words *achievements, products, abilities,* except where otherwise qualified, must necessarily refer to the results of the particular tests employed in this investigation. That some systems may achieve other and possibly quite as worth-while results from their arithmetic work is not denied; but what is denied is that any system can safely fail to attain good results in the work covered by these particular tests. Whatever else the arithmetic work may produce, it seems safe to say that by the end of the sixth school year, it should result in at least good ability in the four fundamental operations and the simple, everyday kind of reasoning called for in these problems. It does not then seem unreasonable, in view of the precautions previously enumerated, to claim that the scores made by the respective systems afford a reliable measure of the products of their respective procedures in arithmetic."

The following tables from Dr. Stone's study show the scores received by each of the twenty-six systems tested in reasoning and in fundamentals together with deviations from the median score, comparative achievements and comparative time expenditure and the ratio of time expenditures to abilities.

## ACHIEVEMENTS OF THE SYSTEMS AS SYSTEMS

*Measured by Scores Made*

TABLE 79

Scores of the Twenty-Six Systems in Reasoning with Deviations from the Median. Scores from all Problems M=551

| Systems in Order of Achievement | Scores Made | Deviations from the Median | Deviations in Per Cent of the Median |
|---|---|---|---|
| XXIII | 356 | —195 | —35 |
| XXIV | 429 | —122 | —22 |
| XVII | 444 | —107 | —19 |
| IV | 464 | —87 | —16 |
| XXV | 464 | —87 | —16 |
| XXII | 468 | —83 | —15 |
| XVI | 469 | —82 | —15 |
| XX | 491 | —60 | —11 |
| XVIII | 509 | —42 | —8 |
| XV | 532 | —19 | —3 |
| III | 533 | —18 | —3 |
| VIII | 538 | —13 | —2 |
| VI | 550 | —1 | —2 |
| I | 552 | 1 | 2 |
| X | 601 | 50 | 9 |
| II | 615 | 64 | 12 |
| XXI | 627 | 76 | 14 |
| XIII | 636 | 85 | 15 |
| XIV | 661 | 110 | 19 |
| IX | 691 | 140 | 20 |
| VII | 734 | 183 | 33 |
| XII | 736 | 185 | 34 |
| XI | 759 | 208 | 38 |
| XXVI | 791 | 240 | 44 |
| XIX | 848 | 297 | 54 |
| V | 914 | 363 | 66 |

TABLE 80

Scores of the Twenty-six Systems in Fundamentals with Deviations from the Median. Scores from all Problems M=3,111

| Systems in Order of Achievement | Scores Made | Deviations from the Median | Deviations in Per Cent of the Median |
|---|---|---|---|
| XXIII | 1,841 | —1,270 | —41 |
| XXV | 2,167 | —944 | —30 |
| XX | 2,168 | —943 | —30 |
| XXII | 2,311 | —800 | —26 |
| VIII | 2,747 | —364 | —12 |
| X | 2,749 | —362 | —12 |
| XV | 2,779 | —332 | —11 |
| III | 2,845 | —266 | —8 |
| I | 2,935 | —176 | —6 |
| XXI | 2,951 | —160 | —5 |
| II | 2,958 | —153 | —5 |
| XVII | 3,042 | —69 | —2 |
| XIII | 3,049 | —62 | —2 |
| VI | 3,173 | 62 | 2 |
| XI | 3,261 | 150 | 5 |
| IX | 3,404 | 293 | 9 |
| XII | 3,410 | 299 | 10 |
| XXIV | 3,513 | 402 | 13 |
| XIV | 3,561 | 450 | 14 |
| IV | 3,563 | 452 | 14 |
| V | 3,569 | 458 | 15 |
| XXVI | 3,682 | 571 | 18 |
| XVI | 3,707 | 596 | 19 |
| XVIII | 3,758 | 647 | 21 |
| VII | 3,782 | 671 | 22 |
| XIX | 4,099 | 988 | 31 |

TABLE 81

THE RELATION OF ACHIEVEMENT IN ARITHMETIC TO TIME ALLOTMENT

| SYSTEMS | COMPARATIVE ACHIEVEMENTS | | | COMPARATIVE TIME EXPENDITURE | | | | TIME DISTRIBUTION AMONG GRADES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average serial standing | Serial standing in reasoning | Serial standing in fundamental | Serial standing in time expenditure | Week minutes devoted to arithmetic | Week minutes devoted to all subjects | Per cent of time to arithmetic | Lower numbers show week minutes devoted to arithmetic; upper show per cent of school time devoted to arithmetic in each grade | | | | | |
| | | | | | | | | 1 | 2 | 3 | 4 | 5 | 6 |
| XXII | 1 | 1 | 1 | 14 | 1,150 | 9,675 | 12 | 7<br>100 | 6<br>100 | 12<br>200 | 15<br>250 | 15<br>250 | 15<br>250 |
| XXV | 3 | 4 | 2 | 2 | 722 | 8,700 | 8 | | 7<br>100 | 9<br>140 | 10<br>155 | 9<br>130 | 13<br>197 |
| XXII | 4½ | 5 | 4 | 1 | 507 | 7,200 | 7 | | 8<br>90 | 8<br>90 | 8<br>90 | 7<br>90 | 11<br>147 |
| XX | 5 | 7 | 3 | 15 | 1,161 | 8,200 | 14 | 7<br>80 | 10<br>113 | 12<br>210 | 14<br>240 | 15<br>265 | 15<br>253 |
| XVII | 7½ | 3 | 12 | 21 | 1,283 | 7,500 | 17 | 2<br>27 | 12<br>158 | 20<br>250 | 20<br>258 | 24<br>300 | 23<br>290 |
| VIII | 8 | 11 | 5 | 18 | 1,258 | 9,600 | 13 | 2<br>25 | 14<br>233 | 15<br>250 | 15<br>250 | 15<br>250 | 15<br>250 |
| XV | 8 | 9 | 7 | 16 | 1,173 | 8,025 | 15 | | 11<br>147 | 15<br>213 | 20<br>292 | 17<br>250 | 18<br>271 |
| III | 9 | 10 | 8 | 6 | 944 | 8,025 | 12 | 10<br>125 | 9<br>125 | 11<br>150 | 11<br>150 | 12<br>165 | 16<br>229 |
| XXIV | 10 | 2 | 18 | 7 | 950 | 8,775 | 11 | | | 14<br>200 | 17<br>250 | 17<br>250 | 17<br>250 |
| X | 10 | 14 | 6 | 5 | 921 | 8,550 | 11 | | 7<br>88 | 12<br>154 | 12<br>184 | 14<br>216 | 18<br>279 |
| I | 11 | 13 | 9 | 9 | 1,068 | 9,375 | 11 | | 9<br>130 | 13<br>213 | 14<br>238 | 14<br>238 | 15<br>249 |
| IV | 12 | 4 | 20 | 26 | 1,854 | 8,400 | 22 | 28<br>249 | 20<br>300 | 20<br>306 | 24<br>361 | 20<br>300 | 23<br>338 |
| II | 13 | 15 | 11 | 17 | 1,247 | 9,900 | 13 | 8<br>121 | 12<br>102 | 14<br>217 | 14<br>225 | 15<br>233 | 16<br>259 |
| XXI | 13 | 16 | 10 | 4 | 865 | 7,650 | 11 | 8<br>80 | 10<br>100 | 10<br>100 | 12<br>180 | 14<br>210 | 13<br>195 |
| VI | 13 | 12 | 14 | 11 | 1,126 | 9,000 | 13 | | 8<br>127 | 12<br>177 | 18<br>266 | 18<br>266 | 19<br>290 |
| XVI | 14½ | 6 | 23 | 12 | 1,127 | 9,000 | 13 | 5<br>75 | 8<br>113 | 13<br>187 | 18<br>263 | 17<br>251 | 16<br>238 |
| XIII | 15 | 17 | 13 | 25 | 1,626 | 8,475 | 19 | | 26<br>388 | 23<br>350 | 18<br>288 | 19<br>300 | 19<br>300 |
| XVIII | 16 | 8 | 24 | 19 | 1,265 | 8,700 | 15 | 6<br>75 | 5<br>75 | 15<br>225 | 20<br>300 | 20<br>300 | 19<br>290 |
| IX | 17½ | 19 | 16 | 22 | 1,559 | 9,000 | 17 | 13<br>200 | 15<br>225 | 18<br>275 | 18<br>275 | 18<br>275 | 21<br>309 |
| XI | 18½ | 22 | 15 | 10 | 1,130 | 8,575 | 13 | | 11<br>157 | 15<br>216 | 18<br>250 | 18<br>250 | 18<br>257 |
| XIV | 18½ | 18 | 10 | 23 | 1,560 | 8,850 | 18 | 15<br>225 | 16<br>245 | 18<br>270 | 19<br>280 | 19<br>270 | 19<br>270 |
| XII | 19 | 21 | 17 | 13 | 1,148 | 8,400 | 14 | | 6<br>81 | 18<br>226 | 16<br>255 | 19<br>288 | 19<br>298 |
| XXVI | 22½ | 23 | 22 | 3 | 837 | 7,200 | 12 | 7<br>80 | 10<br>125 | 10<br>125 | 13<br>150 | 13<br>150 | 17<br>207 |
| VII | 22½ | 20 | 25 | 24 | 1,573 | 7,800 | 20 | 13<br>175 | 19<br>262 | 22<br>300 | 22<br>300 | 22<br>300 | 17<br>236 |
| V | 23 | 25 | 21 | 8 | 971 | 8,700 | 11 | 8<br>113 | 10<br>154 | 11<br>167 | 12<br>175 | 13<br>183 | 13<br>179 |
| XIX | 25 | 24 | 26 | 20 | 1,276 | 9,000 | 14 | 8<br>125 | 10<br>150 | 17<br>250 | 17<br>250 | 13<br>250 | 20<br>301 |

TABLE 82

COMPARISON OF THE ACHIEVEMENTS OF THE SYSTEMS HAVING LESS THAN MEDIAN TIME COST WITH THOSE HAVING MORE

| | COMBINED SCORES OF THE THIRTEEN SYSTEMS | | | |
|---|---|---|---|---|
| | With *less* than Median Time Cost | With *more* than Median Time Cost | With *less* than Median Time Cost | With *more* than Median Time Cost |
| | Including home study | | Without home study | |
| Reasoning | 7,519 | 7,893 | 7,277 | 8,135 |
| Fundamentals | 40,751 | 40,273 | 37,165 | 43,859 |

TABLE 83

RATIO OF TIME EXPENDITURES TO ABILITIES

| SYSTEMS | AVERAGE RATIOS | | REASONING RATIOS | | FUNDAMENTAL RATIOS | |
|---|---|---|---|---|---|---|
| | Serial Standing of Systems | Time Cost to Reasoning and to Fundamentals | Serial Standing of Systems | Time Cost to Reasoning | Serial Standing of Systems | Time Cost to Fundamentals |
| IV | 1 | 2.26 | 1 | 3.99 | 4 | .520 |
| XXIII | 2 | 1.92 | 2 | 3.22 | 1 | .624 |
| XVII | 3 | 1.65 | 3 | 2.88 | 7 | .421 |
| XIII | 4 | 1.54 | 4 | 2.55 | 3 | .533 |
| XX | 5 | 1.45 | 7 | 2.36 | 2 | .535 |
| XVIII | 6 | 1.41 | 5 | 2.48 | 13 | .336 |
| XIV | 7 | 1.40 | 7 | 2.36 | 6 | .438 |
| VIII | 8 | 1.39 | 8 | 2.33 | 5 | .457 |
| IX | 9 | 1.353 | 9 | 2.25 | 5 | .457 |
| XVI | 10 | 1.352 | 6 | 2.40 | 18 | .304 |
| XV | 11 | 1.31 | 11 | 2.20 | 8 | .422 |
| VII | 12 | 1.28 | 12 | 2.14 | 9 | .415 |
| XXIV | 13 | 1.24 | 10 | 2.21 | 21 | .270 |
| II | 14 | 1.22 | 14 | 2.02 | 7 | .421 |
| VI | 15 | 1.20 | 13 | 2.04 | 11 | .354 |
| I | 16 | 1.15 | 15 | 1.93 | 10 | .363 |
| III | 17 | 1.05 | 16 | 1.77 | 16 | .331 |
| XII | 18 | 0.943 | 17 | 1.55 | 13 | .336 |
| XXV | 19 | 0.941 | 17 | 1.55 | 15 | .333 |
| X | 20 | 0.93 | 18 | 1.53 | 14 | .335 |
| XI | 21 | 0.913 | 20 | 1.48 | 12 | .346 |
| XIX | 22 | 0.91 | 19 | 1.50 | 17 | .311 |
| XXI | 23 | 0.82 | 21 | 1.37 | 19 | .293 |
| V | 24 | .67 | 23 | 1.06 | 20 | .272 |
| XXII | 25 | 0.65 | 22 | 1.08 | 23 | .219 |
| XXVI | 26 | 0.64 | 24 | 1.05 | 22 | .227 |

From this investigation Dr. Stone concludes, "That a large amount of time expended is no guarantee of a high standard of abilities may be convincingly seen by comparing the ratios of the five systems spending the smallest amount of time with the five spending the largest. Of the five spending the least time, the average ratio is .80, which corresponds with the 23d or the 3d from the best in ratio; and of the five spending the greatest amount of time, the average ratio is 1.57, which corresponds with the 4th poorest in ratio.

"The last three tables have each shown the decided lack of relationship between time cost and abilities produced, and hence for these systems it is evident that there is practically no relation between time expenditure and arithmetical abilities; and, in view of the representative nature of these twenty-six systems, it is probable that this lack of relationship is the rule the country over.

"This is not to say that a certain amount of time is not essential to the production of arithmetical abilities; nor that, given the same other factors, operating equally well, the product will not increase somewhat with an increased time expenditure. What is claimed is that, as present practice goes, a large amount of time spent on arithmetic is no guarantee of a high degree of efficiency. If one were to choose at random among the schools with more than the median time given to arithmetic, the chances are about equal that he would get a school with an inferior product and conversely, if one were to choose among the schools with less than the median time cost, the chances are about equal that he would get a school with a superior product in arithmetic.

"So far, then, as ability in arithmetic means ability to handle such foundation work as is measured by the tests in this study, this 'essential' has not *necessarily* suffered by the introduction of other subjects and the consequent reduction of its time allotment."

Dr. Stone finds that the influence of the home is not responsible for differences in abilities. He says: "Environment probably has little effect on arithmetical abilities. Of the five highest systems, the majority of pupils of one came from a crowded tenement district, those of two from exceptionally good homes, and those of two from fair. Practically the same distribution is found among the five systems standing lowest." When the time devoted to home study is considered the correlation between abilities and time expenditure is somewhat closer. In the main, differences in abilities are to be explained by teaching and supervision. These differences will grow less when teachers and supervisors know just what results they want to secure and when it is common to make such accurate measurements frequently.

## § 20. School Achievement in Terms of Methods of Work

Education aims to equip children with knowledge, with habits, with appreciations, with ideals and with methods of work. Too often the demand made upon the teacher both by supervisory officers and by the general public, leads him to emphasize results in knowledge or habit to the exclusion of any very definite attempt to secure power of appreciation, purposes of lasting significance, or any adequate command of the methods to be employed in the education which takes place without the aid of a teacher. Teachers, especially in the elementary school, are apt to help pupils too much. In the higher schools one often hears a teacher require a class to study a given lesson, but seldom does one find a teacher much concerned about the method employed in satisfying this demand. Both teaching and studying are most economically accomplished when teacher or student, conscious of the learning processes, adapt themselves to these conditions imposed by the very nature of our mental life.

Guiding children successfully in the development of their mental life as indicated by acquiring knowledge, or habits, or ideals, does not involve the result so much desired of ability to continue this work independent of the help of the teacher. The method which the teacher finds successful must become the conscious tool of the pupil. The teacher who is successful merely through imitation, or by a process of trial and success cannot be expected to teach a boy how to work to best advantage for himself. One very important reason for training teachers in the theory of teaching is found in this necessity for a knowledge of the principles of learning by one who would teach others how best to use such ability as he may possess.

The only investigation of the results commonly secured, or

which we may hope to secure, in power to work independently on the part of school children is found in Dr. Lida B. Earhart's ['08] "Systematic Study in the Elementary School." Some of the results of this study are presented in the pages which follow.

It will be admitted that any possibility of adequate training for independent work depends upon the appreciation which the teacher has of the processes involved. Dr. Earhart asked a large number of teachers to answer the following questionnaire:

1. Assuming that memorizing is one of the processes employed in studying, tell how you would memorize a poem or a chapter in the Bible.
2. Many teachers when directing pupils to study, tell them *to think* about the lesson. Enumerate the various things which you think ought to be done in "thinking about a lesson."
3. Is there anything else which you think ought to be done in studying a lesson?
4. Do you do any of the things named under 1, 2, and 3 more frequently than the others? If so, which are they?
5. When you were a pupil in the Elementary School, were you taught to use any of these steps or processes systematically? If so, which ones?
6. If you have taught in an Elementary School, have you ever trained your pupils there to use any of these steps or processes? If you have, which steps or processes were they?

Some of Dr. Earhart's conclusions follow:

"It is interesting to note that at least 78% of the teachers read or study a poem or chapter before memorizing it. . . .

"Only 23.6% of the teachers report that they divide a selection into thought units in memorizing, while a much longer number use such mechanical divisions as lines, sentences, or stanzas. Again, only about 11% reported that they pictured situations, *i. e.* imagined; 13% said they traced thought relations; and less than 6% that they associated the ideas of the poem or chapter with known facts. More than one-fourth reported that in memorizing they use cumulative repetition, *i. e.* the House-that-Jack Built order of procedure, going from line to line, then back again to the beginning for a fresh start. Wherever details are given

explicitly enough to make the meaning clear, the mechanical side is seen to predominate. . . .

"Some explanation of the failure of so many pupils to work systematically and effectively may be seen in the fact that in stating the various things which they think ought to be done in 'thinking about a lesson' not more than 33 1-3% of the teachers agreed upon any one item. There were at least twenty things mentioned which should be done, and the element considered most important was indicated by one-third of the writers. This was, 'Find the important points'—a very necessary thing to do in studying, the strange part being that so few of the teachers felt its importance. A number of the other items given are either so general as to give no idea of what the writers really meant, or they are mechanical, *e. g.* apperceive, reason, understand the meaning, memorize. Only 15% felt keenly enough to mention it the necessity of finding the main thought or problem. The questions arise: If teachers do not feel the necessity of finding the problem sufficiently to speak of it in describing the process of study, will they be likely to think of it when working with pupils? . . . .

"Attention, interest, perception, apperception, imagination, memory, correlation, comparison, and reason—these make up one-third of the separate items in answer to the third question, and tell a minimum as to what is really to be done. The large number of items and the indefiniteness of many of them, show that these teachers do not clearly see the nature of study. No steps stand out strongly in the minds of a large number, but instead there is confusion of thought, and lack of agreement. . . .

"In answering the questions: Do you do any of the things mentioned under 1, 2, and 3, more frequently than the others? If so, which are they? the teachers limited the number of steps mentioned but still scattered their votes, showing the same fail-

ure to recognize essential features. Twenty-four per cent said they memorized more frequently than anything else; and as low a per cent as appears, 1.2%, represents the number who recognized the importance of finding the aim or problem. . . .

"The fifth question answered by the teachers was: When you were a pupil in the elementary school, were you taught to use any of these steps or processes systematically? If so, which ones? Eliminating those who reported definitely that they were not taught, those who did not remember, and those whose answers were not relevant—nearly 65% of the teachers, there are 35% left who say they were systematically taught. 20.6%, much more than half of this remnant, were taught to memorize, while the factors of logical study are hardly recognized at all in this report."

Dr. Earhart also calls attention to the type of assignment as indicating a lack of appreciation on the part of teachers of the necessity for a problem or aim.

"Five lesson assignments in sixth grade history were observed, and three recitations, the two exercises being separated in time. The results can be shown briefly.

| | | | |
|---|---|---|---|
| 1. | Total number of classes observed | | 5 |
| | | Classes | Per ct |
| 2. | Lesson assigned by subject | 4 | 80 |
| 3. | Lesson assigned by pages or paragraphs | 2 | 40 |
| 4. | Pupils directed to references | 1 | 20 |
| 5. | Pupils directed to ask questions | 1 | 20 |
| 6. | Pupils directed to read lesson | 1 | 20 |
| 7. | Pupils directed to read smoothly | 1 | 20 |
| 1. | Total classes visited | | 12 |
| | | Classes | Per ct |
| 2. | Number of assignments not observed | 7 | 58.3 |
| 3. | Number of assignments by pages | 2 | 16.7 |
| 4. | Number of assignments by subject | 2 | 16.7 |
| 5. | Number of times teacher gave questions | 1 | 8.3 |
| | The recitations showed these details: | | |
| 1. | Total number of classes visited | | 12 |
| | | Classes | Per ct |
| 2. | Number of drill or review exercises | 4 | 33.3 |
| 3. | Number of times teacher gave outline | 3 | 25. |

| | | Classes | Per ct. |
|---|---|---|---|
| 4. | Number of times pupils found topics | 1 | 8.3 |
| 5. | Number of memory recitations observed | 1 | 8.3 |
| 6. | Number of times teacher supplemented text | 1 | 8.3 |
| 7. | Number of times pupils supplemented text | 1 | 8.3 |
| 8. | Number of times pupils reasoned or explained | 5 | 41.7 |
| 9. | Number of times teacher questioned | 9 | 75. |
| 10. | Number of recitations not observed | 2 | 16.7 |

"These observations, like most of the others, reveal the teacher doing nearly all of the work, and very little initiative or opportunity for independent, constructive work left to the pupils. In not a single class did the pupils question or participate in discussion."

Dr. Earhart took a fourth grade class in literature for sixteen lessons in order to discover how much could be accomplished in that length of time toward teaching them how to study. Quotations from her description of the experiment and the results secured follow.

"The early recitations showed that the pupils responded with interest to the subject matter, and that they desired information in regard to many things, these frequently being facts which the editor had omitted. They were ready to pass judgment as to character, as for example, when they commended Nausicaa's act of kindness to Ulysses. But these lessons showed, also, that the pupils needed to look for the problems in the story; that they needed training in analysis and organization of the material; in making out the pronunciation and meaning of words, and in thinking out the meaning of sentences. The teacher found, too, that she needed to eliminate herself more thoroughly, and throw more responsibility upon the class.

"In the third lesson the pupils were asked to suggest ways for finding out the meaning of words needed in reading. Various means were presented, and at last the class decided to try to use another word in the place of the word not understood. After that lesson, they took care of meanings themselves, asking to

have a word substituted for the word which they could not understand. They grew very critical, refusing definitions and explanations, and objecting to words whose substitution did not bring understanding or satisfaction. They would say, 'You did not do what I asked you,' and more than once a pupil was told to sit down because his answer was not what had been asked for. They were attempting to satisfy needs, and were very discriminating in their judgment about words. The previously felt difficulty about synonyms disappeared whenever the need of such words was felt. . . .

"The first lesson showed that the pupils were not able to divide the lesson into parts. In the fourth lesson, they were asked to think of a good name for a certain part of the story and to write these names on paper. Out of a class of twenty, one began to write the story, and two or three did nothing. A few were absent. The rest gave the following list, which is a great gain over the first lesson:

Ulysses meets Nausicaa.
When Ulysses meets Nausicaa.
Ulysses and Nausicaa.
Ulysses speaking to Nausicaa.
Nausicaa meets the stranger which is Ulysses.
Ulysses.
Ulysses gets food and drink.
Ulysses goes to town.
Nausicaa clothes Ulysses.

"A few other similar to these were given.

"Towards the close of the series of lessons, after the pupils had read the booklet of eight pages entitled, *Penelope and Telemachus during Ulysses' Absence*, they were asked to name in order the things they would talk about if they were telling the story to some one at home. They gave the following outline very promptly:

The princes wish to marry Penelope.
Penelope deceives the princes.

Telemachus holds a council.
Telemachus goes to inquire about Ulysses.
Telemachus visits Nestor.
Telemachus visits Menelaus.
The suitors making ready to kill Telemachus.
Penelope hears of Telemachus' absence. . . .

"One example of their filling out and explaining situations was afforded by the answers to the question of a child who asked, 'How did Ulysses know that Nausicaa was the daughter of a king? He had never seen her before.' The following replies were given: (1) 'Because she stayed, although the maidens ran away.' (2) 'Because she had mules.' (3) 'Because she had maids.' (4) 'Maybe she had nice clothes.' (5) 'Maybe she wore a band of gold on her head.' At another time, a child asked, 'Why did the suitors want to marry Penelope?' One little girl gave in substance this reply: 'Because she was gentle and kind, and was not lazy, but looked after the house. She could spin, and could weave beautiful cloth. She could do her own washing.' . . .

"When the last booklet in the story of Ulysses was taken up, there was time for but one lesson with the class, so that results had to be hurried somewhat. The pupils had already stated the questions to be answered and these constituted the aims in reading this section. They were told to read through the entire booklet of eight pages silently, then to make a list of the important subjects in it, to write any questions which they would like to have answered, and any words in place of which they would like to have other words used. These papers were written by the pupils with no help whatever save in regard to spelling, use of capital letters, and punctuation. Some of the papers are here reported just as they were written.

ROSE

1. Ulysses awakens.
2. The swineherd gives food to Ulysses.
3. Telemachus goes to the swineherd's house.

4. Ulysses tells Telemachus that he is his beloved father.
5. Ulysses dines with Telemachus, and the swineherd.
6. Telemachus goes to town to see his mother.
7. Telemachus tells Penelope what had happened when he was away.
8. Ulysses goes to the palace as a beggar.
9. Penelope hears of the shameful treatment.
10. Ulysses tells Penelope what he had heard from Ulysses not long ago.
11. The nurse gives Ulysses a bath.
12. The nurse fells (feels) Ulysses scar.
13. Ulysses kills the suitors.
14. Telemachus and Ulysses goes to the house of Laertes.
15. Ulysses reigned over Ithaca as beloved as before.

Why did Ulysses kill the suitors, why did he not send them away?
Why did Ulysses go to town as a beggar, why did he not show himself?
Why didn't Ulysses tell the swineherd he was his master?
Why did Telemachus and Ulysses store the weapons in the inner rooms?
Why don't Ulysses tell Penelope that he was Ulysses instead of telling her that he has fought by Ulysses' side?
Why did Ulysses sleep, why did he not wake up and go to town?
Why did Ulysses go to the house of Laertes?

scrip
revels
threatened
dole

EARL.

1. Ulysses awakes.
2. Ulysses and the swineherd.
3. Ulysses meets Telemachus again.
4. Penelope and Telemachus.
5. Penelope and the beggar.
6. The nurse recognizes Ulysses.
7. Penelope gives a contest.
8. Ulysses tries the bow.
9. The death of the suitors.
10. Ulysses rules over Ithaca again.

Why did Ulysses go to the swineherd?
Why did Ulysses beg for his bread?
Why didn't Ulysses tell Penelope that he was her husband?
Why did Telemachus go to the house of Laertes?

| | | |
|---|---|---|
| procured | treachery | rumor |
| scrip | abusive | adjourned |
| thong | bower | covenant |
| revels | combat | reigned |

"Several papers were prepared which were quite equal to Earl's and some might be considered better. The rest would grade in excellence from these down to the following one prepared by a boy who had been in class only two or three days when the exercise was given:

1. When Ulysses wakened from his sleep.
2. He bought from a sheapherd a ragged dirty clock (cloak).
3. He went to visit the swineherd.
4. As she bathed his feet she touched the scar.

"This series of lessons showed plainly that pupils in the fourth grade are capable of finding problems for themselves, of organizing the lesson, of asking intelligent questions, of forming sensible hypotheses, of exercising judgment as to the statements made by the author, of mastering formal difficulties for themselves, and, in various ways, of exercising initiative wisely and profitably. It shows, too, that when pupils work in such a way they work with zeal, and accomplish much more than is done when they must spend time upon useless details and mechanical methods of working."

## § 21. School Records and Reports

The development of adequate school records and significant school reports may be traced on the one hand to the growth of the profession of education, and on the other to the demand which the public is now making for complete information concerning public enterprises. There was a time when it was customary for school boards or school committees to make a report consisting largely in a statement of their activities in hiring teachers, building and equipping school plants, and in visiting the schools. To-day teachers are hired and schools are organized and administered by an educational expert, and in like manner school reports are an account of the results secured under the direction of the school's chief executive officer. When school boards told of their activities, the schools were relatively few and the organization simple. The reports which they rendered demanded little in the way of expert knowledge either of schools or of refined methods of recording or reporting school activities. To-day there are many people who judge of the efficiency of a school superintendent in terms of his ability to satisfy any inquiry which may be made concerning the course of study, the teachers, the pupils, or fiscal aspects of the problem with which he deals, together with any interrelation which may exist among these several parts of the whole problem.

It is not easy to distinguish between records and reports. The records which are accumulated in any one field furnish the raw material of the report which is made concerning this aspect of school practice. Original records are significant only as they are combined in such a way as to throw light upon the particular problems involved. Of course it is true that reports commonly include much discussion of school policy which is not based in

any considerable degree upon school records. However, with the demand that is being made with greater and greater frequency that any problem be supported with a statement of the results which may be expected, makes the relationship between records kept in the school system itself, or derived from other school systems, a matter of primary importance even in that part of the report which is frankly a discussion of future development. Indeed, it may well be claimed that it is a primary function of school records to make known school needs.

It is only in recent years that any considerable addition has been given to the form of the records or reports of school systems. A few years ago a report of attendance giving the total number enrolled and the average daily attendance, would probably have been considered satisfactory. In addition to the record of attendance, one would probably have found a scholarship record kept by each teacher. In the same system one would have found a very simple system of accounting and a report of expenditures distributed among a very few items, such as teachers' salaries, text-books, stationery, fuel, and possibly a few other items. Quite commonly a large part of the total amount expended was reported as miscellaneous expenses. This tendency to report in terms of totals and averages has been superseded by the demand for all of the facts. Students of education, as well as those who are interested in public enterprises, whether in education or in some other field, have come to realize that it is necessary to know the facts in terms of their distribution, showing the limits or range within which the cases considered lie, the central tendency, variability, and the like, if any adequate interpretation of the situation is to be hoped for (See article on Statistical Method). This demand for adequate statistical treatment of school facts is being met throughout the world to-day by an improved system of records and by more adequate reporting. As examples of this development, one might cite the cumulative

pupil record card, and the form for reporting fiscal statistics, which have been recently recommended by a committee of the Department of Superintendence of the National Education Association.

Five years ago there were very few cities, probably not more than thirty, in the United States who could, without very great difficulty, furnish a record of a pupil's school life from the time he entered school to the date upon which the inquiry was made. To-day there are more than two hundred cities who have reported to the committee referred to above that they are using a cumulative record card at least as adequate as the one recommended by the N. E. A. Committee. A copy of this card follows:

ELEMENTARY SCHOOL RECORD SYSTEM—PROMOTION RECORD

This card is to pass from teacher to teacher or from school to school as the pupil is promoted or transferred. It is to be filled out and sent to the principal's office when any change is made requiring a change in the office records. It is then to be sent to the teacher who has the pupil.

| (a) School | (b) Date of admission | (c) Age Sept. 1 | | (d) Grade | (e) Room | (f) Days present | (g) Health | (h) Conduct | (i) Scholarship |
|---|---|---|---|---|---|---|---|---|---|
| | | *Yrs.* | *Mos.* | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |
| | | | | | | | | | (over) |

| (1) 1. Last name..... | (2) First name and initial..... | ELEMENTARY SCHOOL RECORD SYSTEM—ADMISSION, DISCHARGE, AND PROMOTION CARD. |
|---|---|---|
| (3) Place of birth..... | (4) Date of birth (5) Vaccinated | To be kept for every pupil and sent with the pupil when he is transferred to any school, either public or private, in the city or outside the city. Great care should be used to have the names complete and correct. Write all dates as follows: 1912–9–25. |
| (6) Name of parent or guardian. ..... | (7) Occupation of parent or guardian. ..... | |

| (8) Residence. (Use one column at a time. Give new residence when pupil is transferred.) | | (9) Date of discharge | (10) Age | |
|---|---|---|---|---|
| | | | *Yrs.* | *Mos.* |
| ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... |
| ..... | ..... | ..... | ..... | ..... |

When a pupil is permanently discharged to work, to remain at home, or because of death, permanent illness, or commitment to an institution, this card is to be returned to the principal's office and a full statement of the cause of the pupil's discharge is to be made in the blank space remaining above.

8–304 (over)

A cumulative record card similar to the one given above should be kept for every child throughout his entire school career. From such a pupil record it will be possible at any time during the pupil's attendance in public schools to determine: 1. The amount of attendance of individual pupils for one year; 2. comparative rates of progress in schools having school terms differing in length; 3. classification of pupils by age and grade; 4. classification of pupils for enrollment date (a) duplicate enrollment in the school, (b) duplicate in other public schools in the same

town or city, (c) duplicate enrollment from other public schools in the same city, (d) original enrollment from all other sources; 5. the number of times a child has been detained in a grade; 6. foreign birth or parentage as affecting progress; 7. kindergarten training as affecting progress; 8. transfers as affecting progress; 9. the effect of attendance (or absences) on progress; 10. inquiries having to do with individual school management, as well as many other valuable and interesting facts about school children.

The demand for better fiscal statistics is well illustrated by the form recommended by the National Education Association Committee, which follows:

A. PAYMENTS

I. EXPENSES (COST OF CONDUCTING SCHOOL SYSTEM)

| | Total | Salaries | Other objects |
|---|---|---|---|
| EXPENSES OF GENERAL CONTROL (OVERHEAD CHARGES) | | | |
| 1. Board of education and secretary's office | | | |
| 2. School elections and school census | | | |
| 3. Finance offices and accounts | | | |
| 4. Legal services | | | |
| 5. Operation and maintenance of office building | | | |
| 6. Offices in charge of buildings and supplies | | | |
| | | | |
| | | | |
| 7. Office of superintendent of schools | | | |
| 8. Enforcement of compulsory education and truancy laws | | | |
| 9. Other expenses of general control | | | |
| 10. Total | | | |

| | Total | Schools and Special Activities | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Day Schools | | Evening Schools | | | | | |
| | | Elementary, including kindergarten | Secondary (high) | Elementary | Secondary | Normal schools | Schools for the industries | Special schools | Special activities |
| EXPENSES OF INSTRUCTION | | | | | | | | | |
| 11. Salaries of supervisors of grades and subjects | | | | | | | | | |
| 12. Other expenses of supervisors | | | | | | | | | |
| 13. Salaries of principals and their clerks | | | | | | | | | |
| 14. Other expenses of principals | | | | | | | | | |
| 15. Salaries of teachers | | | | | | | | | |
| 16. Textbooks | | | | | | | | | |
| 17. Stationery and supplies used in instruction | | | | | | | | | |
| 18. Other expenses of instruction | | | | | | | | | |
| 19. Total | | | | | | | | | |
| EXPENSES OF OPERATION OF SCHOOL PLANT | | | | | | | | | |
| 20. Wages of janitors and other employees | | | | | | | | | |
| 21. Fuel | | | | | | | | | |
| 22. Water | | | | | | | | | |
| 23. Light and power | | | | | | | | | |
| 24. Janitor's supplies | | | | | | | | | |
| 25. Other expenses of operation of school plant | | | | | | | | | |
| 26. Total | | | | | | | | | |

A. PAYMENTS—*Continued*

I. EXPENSES (COST OF CONDUCTING SCHOOL SYSTEM)—*Continued*

| | Total | Schools and Special Activities | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Day Schools | | Evening Schools | | | | | |
| | | Elementary, including kindergarten | Secondary (high) | Elementary | Secondary | Normal schools | Schools for the industries | Special schools | Special activities |
| EXPENSES OF MAINTENANCE OF SCHOOL PLANT | | | | | | | | | |
| 27. Repair of buildings and upkeep of grounds | | | | | | | | | |
| 28. Repair and replacement of equipment | | | | | | | | | |
| 29. Insurance | | | | | | | | | |
| 30. Other expenses of maintenance of school plant | | | | | | | | | |
| 31. Total | | | | | | | | | |
| EXPENSES OF AUXILIARY AGENCIES | | | | | | | | | |
| LIBRARIES | | | | | | | | | |
| 32. Salaries | | | | | | | | | |
| 33. Books | | | | | | | | | |
| 34. Other expenses | | | | | | | | | |
| PROMOTION OF HEALTH | | | | | | | | | |
| 35. Salaries | | | | | | | | | |
| 36. Other expenses | | | | | | | | | |
| TRANSPORTATION OF PUPILS | | | | | | | | | |
| 37. Salaries | | | | | | | | | |
| 38. Other expenses | | | | | | | | | |
| 39. Total | | | | | | | | | |
| MISCELLANEOUS EXPENSES | | | | | | | | | |
| 40. Payments to private schools | | | | | | | | | |
| 41. Payments to schools of other civil divisions | | | | | | | | | |
| 42. Care of children in institutions | | | | | | | | | |
| 43. Pensions | | | | | | | | | |
| 44. Rent | | | | | | | | | |
| 45. Other miscellaneous expenses | | | | | | | | | |
| 46. Total | | | | | | | | | |

A. PAYMENTS—*Continued*

II. Outlays (Capital Acquisition and Construction)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 47. Land | | | | | | | | | | |
| 48. New buildings | | | | | | | | | | |
| 49. Alteration of old buildings | | | | | | | | | | |
| 50. Equipment of new buildings and grounds | | | | | | | | | | |
| 51. Equipment of old buildings, exclusive of replacements | | | | | | | | | | |
| 52. Total | | | | | | | | | | |

III. Other Payments

| | |
|---|---|
| 53. Redemption of bonds | $ |
| 54. Redemption of short-term loans | |
| 55. Payment of warrants and orders of preceding year | |
| 56. Payments to sinking funds | |
| 57. Payments of interest | |
| 58. Miscellaneous payments, including payments to trust funds, textbooks to be sold to pupils, etc. | |
| 59. Total | |
| 60. Balances at close of year at | $ |
| 61. Total payments and balances | |

B. RECEIPTS

Revenue Receipts

| | |
|---|---|
| 62. Subventions and grants from State | $ |
| 63. Subventions and grants from county | |
| 64. Subventions and grants from other civil divisions | |
| 65. Appropriations from city treasury | |
| 66. General property taxes | |
| 67. Business taxes (licenses, excise taxes, taxes on corporations, taxes on occupations, etc.) | |
| 68. Poll taxes | |
| 69. Fines and penalties | |
| 70. Rents and interest | |
| 71. Tuition and other fees from patrons | |
| 72. Transfers from other districts in payment of tuition | |
| 73. All other revenue | |
| 74. Total revenue receipts | |

Non-revenue Receipts

| | |
|---|---|
| 75. Loans and bond sales | $ |
| 76. Warrants issued and unpaid | |
| 77. Sales of real property and proceeds of insurance adjustment | |
| 78. Sales of equipment and supplies | |
| 79. Refund of payments | |
| 80. Other non-revenue receipts | |
| 81. Total non-revenue receipts | |
| 82. Total receipts | |
| 83. Balances at beginning of year | |
| 84. Total receipts and balances | |

C. VALUE OF SCHOOL PROPERTIES

| CLASS OF BUILDINGS | Total Value of Sites, Buildings, and Equipment | Value of Sites and Buildings | Value of Equipment | Interest on Value of School Plant |
|---|---|---|---|---|
| General control | | | | |
| Elementary schools | | | | |
| Secondary schools | | | | |
| Normal schools | | | | |
| Schools for the industries | | | | |
| Special schools | | | | |

A few years ago very few cities could have distributed their expenditures in any such manner as is indicated in this form. It was not common either to indicate as clearly as is demanded above, the purpose for which money was spent, nor the particular type of institution or activity for which money was used. There are to-day four hundred and eighteen cities reporting to the N. E. A. Committee that their system of accounting enables them to give reports at least as adequate as that indicated in this form. This means, of course, that there has been in recent years an increased addition to the business aspect of school administration. In many cases it means that a special officer, variously called a business manager, a secretary, a controller, or a school auditor, has been added to the staff employed by the Board of Education.

Further illustration of the more adequate form of report may be indicated by calling attention to forms of reporting now commonly used in our school reports. It was not unusual a few years ago to have school salaries reported as a single item. Manifestly the truth about salaries can be known only when we know how many teachers receive each of the several salary amounts, as indicated in a table like the following. Tables of this kind are not now uncommon. See Table 84.

TABLE 84

| Number of Elementary-school Teachers with Salaries— | | Number of High-school Teachers with Salaries— | |
|---|---|---|---|
| Below $350 | | Below $500 | |
| $350 to 400 | | $500 to $600 | |
| 400 to 450 | | 600 to 700 | |
| 450 to 500 | | 700 to 800 | |
| 500 to 550 | | 800 to 900 | |
| 550 to 600 | | 900 to 1,000 | |
| 600 to 650 | | 1,000 to 1,100 | |
| 650 to 700 | | 1,100 to 1,200 | |
| 700 to 750 | | 1,200 to 1,300 | |
| 750 to 800 | | 1,300 to 1,400 | |
| 800 to 850 | | 1,400 to 1,500 | |
| 850 to 900 | | 1,500 to 1,600 | |
| 900 to 950 | | 1,600 to 1,700 | |
| 950 to 1,000 | | 1,700 to 1,800 | |
| 1,000 to 1,050 | | 1,800 to 1,900 | |
| 1,050 to 1,100 | | 1,900 to 2,000 | |
| 1,100 to 1,150 | | 2,000 and above | |
| 1,150 to 1,200 | | | |
| 1,200 and above | | | |

Any adequate study of school organization involves a consideration of the distribution of children by ages and grades. An age grade table, such as is given below in Table 85 is now commonly found in school reports.

TABLE 85

DISTRIBUTION OF ENROLLMENT AT DATE OF THIS REPORT, BY AGES AND GRADES [1]

| AGES | GRADES | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | First | | | Second | | | Third | | | Fourth | | | Fifth | | | Sixth | | | Seventh | | | Eighth | | | Total | | |
| | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total | Boys | Girls | Total |
| 6 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 years | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total by grades | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Below normal age | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Normal age | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Above normal age | | | | | | | | | | | | | | | | | | | | | | | | | | | |

[1] Give age Sept. 1.

Instead of the reports which give the average daily attendance of pupils, we are coming to have reports which tell the whole truth about attendance by distributing the number of days attended as is indicated in Table 86.

TABLE 86

DISTRIBUTION OF ATTENDANCE

| TIME | Boys | Girls | Per Cent of Whole Number |
|---|---|---|---|
| Attending less than 10 days | | | |
| " 10 days to 19 days | | | |
| " 20 " 29 " | | | |
| " 30 " 39 " | | | |
| " 40 " 49 " | | | |
| " 50 " 59 " | | | |
| " 60 " 69 " | | | |
| " 70 " 79 " | | | |
| " 80 " 89 " | | | |
| " 90 " 99 " | | | |
| " 100 " 109 " | | | |
| " 110 " 119 " | | | |
| " 120 " 129 " | | | |
| " 130 " 139 " | | | |
| " 140 " 149 " | | | |
| " 150 " 159 " | | | |
| " 160 " 169 " | | | |
| " 170 " 179 " | | | |
| " 180 " 189 " | | | |
| " 190 " 199 " | | | |
| Total (equal enrollment for term) | | | |

In like manner tables which give enrollment, promotions and non-promotions by grade and by causes, failures by subjects and by grades, withdrawals by ages, by grades, and by causes, are becoming more and more common in school reports.

On the side of fiscal statistics, we are beginning to have reports which attempt to analyze expenditures in such a way as to show the total cost per pupil in various grades or types of schools, the cost per pupil for various items, such as instruction, books and supplies, fuel, and the like, and in some cases a careful analysis and comparison is made of costs among the several units of the

school system, as, for example, upon the basis of school buildings or plants.

In the newer type of report, it is common to illustrate with charts, diagrams, and pictures. There is an attempt made to tell the story in such a way as to interest the reader, as well as to convey information to the specialists. In some cities definite plans are made for publicity through the newspaper, or in some cases by issuing partial reports on special subjects of interest from time to time throughout the school year.

Another interesting development in modern reports is the appreciation of the fact that it may not be wise to attempt to cover every subject with equal completeness each year. It may be argued that the best report is the one which specializes upon some one aspect of the school problem once in three or once in five years. Of course it is necessary, if such a cycle of reports is instituted, to give the essential facts each year. If, for example, the following cycle were followed, first year, curriculum, including special schools and special classes; second year, finance; third year, pupils; fourth year, teachers; fifth year, buildings and equipment, the report would undoubtedly convey certain information concerning each of these fields each year. On the other hand, in each of the five years the topic which was considered the special order for the year, would be treated exhaustively. In so far as statistics or reports are valuable for the guidance of those who administer our schools, there would be great advantage in the adoption of some such plan as indicated above. To have an exhaustive treatment of a topic once in five years would be just as satisfactory as to have the topic treated with like fullness each year. Since space and effort must be economized, there is manifestly a very great advantage in treating in successive years several different topics, and then returning to treat each of these topics again after the lapse of a definite period.

Possibly the most interesting development in recent years is

found in the demand for uniformity in recording and reporting. Our state education officers have demanded uniform reports within the city. For the most part, these reports have been very inadequate, and have been thought of as significant mainly in so far as the information derived was used as a basis for determining the aid given to the local community from the state. The movement for uniformity, which has taken form in the National Education Association in the appointment of a special committee on uniform records and reports, may be expected in time to affect the state officers as well as city school systems. This committee has, since its appointment, worked in coöperation with the United States Bureau of Education, the Census Office, and the Association of School Accounting Officers. These four bodies have agreed upon a uniform program. The United States Bureau of Education has from time to time modified its schedules in accordance with the recommendations of the joint committee. The Bureau has also invited state and city superintendents for conferences, and has sent out its forms for criticism to city and state officers before issuing them in permanent form. It is to be expected that from this campaign of education there will come a realization of the importance of uniformity as well as greater interest in records and reports.

Hope for more adequate recording and reporting is to be found, too, in the increased demand made upon those who would enter the profession. Courses in school management and in school supervision and administration in normal schools and colleges, are to-day sending students into the field with some appreciation of statistical method, and with some acquaintance with the best practice with respect to records and reports. The movement for adequate records and reports is a part of the development of a science, as well as of a profession of education. The demand upon the part of the public for such adequate information is even greater than the demand for efficiency in teaching.

# PART V

## SCHOOL FINANCES

## § 22. City School Expenditures

The financial problem in connection with our public schools is fundamental. We may devise improved courses of study, we may provide for the proper training of teachers, our aim may be sound and our method well grounded, and still we must have the money to build and properly equip and maintain buildings, to provide the necessary books and supplies, to hire the competent supervisors and teachers, or all will count for naught. We believe that our schools have advanced in this country during the past fifty years, and we know that along with this advance the amount of money spent for public education has increased in a ratio altogether out of proportion to the number of people educated. Still further, we believe that those sections of our country which to-day spend the most money for public education are the sections which are doing the best work. Especially with the growth of cities and the great increase of urban population has the amount of money spent for public schools grown larger. But even the great increase in expenditure, amounting in some cases to ten- or even twenty-fold during the past fifty years, has not been sufficient to satisfy the demands of those who believe in the efficacy and necessity of public education in our modern democracy.

President Eliot, in his address before the Connecticut State Teachers' Association in 1902, argued for more liberal expenditures for public education, in order that we might accomplish by this means certain desirable ends which we have as yet failed to attain. He sums up his argument in one part of his address as follows: "My first argument in support of this proposition is that, as a nation and on the whole, in spite of many successes, we have met with many failures of various sorts in our efforts to educate the whole people, and still see before us many unsur-

mounted difficulties. It is indisputable that we have experienced a profound disappointment in the results thus far obtained from a widely diffused popular education. It was a stupendous undertaking at the start, and the difficulties have increased with every generation. Our forefathers expected miracles of prompt enlightenment; and we are seriously disappointed that popular education has not defended us against barbarian vices like drunkenness and gambling, against increase of crime and insanity, and against innumerable delusions, impostors, and follies. We ought to spend more public money on schools, because the present expenditures do not produce all the good results which were expected and may reasonably be aimed at." [1]

In a second address to the New Hampshire State Teachers' Association in the same year, President Eliot maintained that more money should be given to the public schools, because of the great gains that have been made in public education. Some of the improvements to which he called attention were the establishment of kindergartens, improvement in the curricula of elementary schools, increase in the number of high schools, improvement in school buildings, new kinds of schools (manual training, the mechanic arts high school, the evening school, and the vacation school), improvement in normal schools, improved methods of selecting and appointing teachers, pensions for teachers, increased employment of educational experts in supervising and executive functions of urban school systems, the increased use of high schools, the introduction of the costly elective system, better university teachers, improved professional training, increased opportunity for the higher education of women, and increased attention given to the welfare of the body. Every one of these educational improvements, says President Eliot, "has been costly; but every one has justified itself in the eyes of the taxpayers, or of those who voluntarily pay for it; not one would now

[1] Eliot, *More Money for the Public Schools*, p. 23.

be recalled, and the total result encourages the expectation that large new expenditures would commend themselves to the people at the start, and in the end would prove to be both profitable in the material sense and civilizing in the humane sense.

"You have doubtless noticed that the gains I have reported are chiefly in education above fourteen years of age. There has been improvement in the first eight grades since 1870, but it is relatively small. Yet the great majority of American children do not get beyond the eighth grade. Philanthropists, social philosophers, and friends of free institutions, is that the fit educational outcome of a century of democracy in an undeveloped country of immense natural resources? Leaders and guides of the people, is that what you think just and safe? People of the United States, is that what you desire and intend?" [1]

There is nothing unusual nor radical in this appeal of President Eliot. In almost every educational journal one can find arguments for increased expenditures for teachers' salaries. In many states laws have been passed or proposed which declare that all text-books shall be furnished free to children. In every community new school buildings are built better than the old. More attention is given to proper heating, lighting, and ventilating. All this means an increase in school expenditures. Along with this great increase in expenditure and with the demand for still greater sums of money for public education, there has arisen the necessity for greater ability in the handling of school moneys, and, on the part of the tax-payers who furnish the money, a desire to know how the money is spent and what results are obtained.

Those who have controlled our free public schools have always had the double function of attending to the business affairs of the school system, as well as looking after the matter of instruction. In the early days, when the chief expenditure was for the teacher's salary and there were very few other items of expense, it was a

[1] Eliot, *More Money for the Public Schools*, pp. 125–127.

comparatively simple matter to administer the finances of the then small schools systems. With the great growth of cities and school systems, together with the enormous increase in amount and variety of expenditures, the problem of business administration has become very complex. This demand for expert ability in dealing with the business affairs of the schools has been met in different ways. In some instances a special committee of the school board or committee has been given charge of the financial affairs of the schools. In many cases the superintendent has not only supervised instruction, but has also been the business manager for the school system. In other cases, notably in Cleveland and Indianapolis, a special executive officer has been provided to look after the business affairs. There is a growing feeling that the business affairs of the large school systems demand expert ability, and that it is financially profitable for a large city to employ a business director to look after the financial interests of the school system. The Chicago Commission, appointed in 1898, recommended that the function of the school board "be chiefly legislative, the executive work being delegated to the superintendent and business manager."[1] However desirable it may be to have a special executive officer whose duty it shall be to look after the business affairs of the schools, the fact remains that in vastly the greater majority of cities of over ten thousand inhabitants this work is now done by the school board, by the superintendent of schools, or by the board and the superintendent in coöperation with each other.

In the year 1899 there reported to the Department of Superintendence of the National Educational Association the Committee on Uniform Financial Reports, which had been appointed at the previous meeting. Something of the purpose for which this Committee was appointed, as well as their recommendations, may be found in the following quotation:

[1] *Report of the Chicago Educational Commission.*

"While local conditions enter into the necessities for expense in any public school system, yet one of the most useful means of estimating proper expenditures should be afforded by a study of the financial school reports of other similar cities or districts. As these reports are at present made, they are of little use in this respect. Items given in one report are omitted from another. Items of income and outgo are differently grouped in different reports, and the statement is made in such a way that it is impossible to separate the items for the purpose of re-classification. In getting the cost of education per child, different items are put into the total cost of education, which forms the dividend, while the divisor is sometimes the number enrolled, sometimes the average number in daily membership, sometimes the average number in daily attendance.

"One of the chief studies of a wise administrator of schools is to make the cost of education per child as low as is consistent with the best service. Attention to this and to the comparative study of the reports for a period of years, now that most of our school systems are established on a somewhat similar plan, should give an idea of the average or normal cost of education per child. Having this, the manager of schools may know how expense in his system differs from this normal standard and, if not normal, why it is above or below. This knowledge cannot be arrived at, however, until the same items are included when comparing cost of education, and the same divisor is used when obtaining the average. By careful comparative study, railroad men know the average cost of hauling freight per ton per mile, and the cost per mile of transporting a passenger. Those administering schools should be as well informed upon the cost of education."[1]

During the past five years there has been much discussion concerning the efficiency of those charged with the control of our

[1] *Proceedings of the National Educational Association*, 1899, p. 345.

municipal activities. There have been investigations of various city departments, budget exhibits and surveys. Our schools have come in for their share of these investigations. There has developed a demand for adequate records and reports, for the standardization of supplies and for definite units of cost for various educational activities.

At the meeting of the department of superintendence of the National Education Association in Indianapolis in 1910, a committee on uniform records and reports was appointed. This committee made its final report at St. Louis in 1912. Among other recommendations, a form for reporting fiscal statistics was submitted. This schedule was prepared by the committee of the department of superintendence acting in coöperation with the United States Bureau of Education, the Census Office, and the National Association of School Accounting Officers. Many of the more progressive cities have already introduced systems of accounting which will make possible a report at least as detailed as is called for by the form recommended. This schedule is sent to all of the larger cities by the Bureau of Education in asking for a report of fiscal statistics.[1]

During the years 1903–1905 inclusive the writer made an investigation of city school expenditures. The data which furnish the basis of this study were secured from fifty-eight cities of between ten and fifty thousand inhabitants, located in Massachusetts, Rhode Island, Connecticut, New York, and New Jersey. To the superintendent of schools in each city the following blank form was sent.

[1] This schedule will be found on pp. 255–258.

TEACHERS COLLEGE
COLUMBIA UNIVERSITY
NEW YORK

*Data for research in Educational Administration. School Expenditures for the year* 190 *and* 190 *, in the city of* ..... *state of* .....

| | | |
|---|---|---|
| **I. Current Expenses:** | | $ |
| 1. Salaries for supervision (Superintendent, Assistant, Deputy, or Associate Superintendents, and Principals) | | |
| 2. Salaries for business administration (salaries of members of the Board of Education, Business Manager, Superintendent of Buildings and Grounds, Clerks to Board of Education, etc., etc.) | No. | |
| 3. Salaries of Janitors (number and aggregate of their salaries) | | |
| 4. Salaries of Matrons or Maids in connection with Kindergartens and Baths (number and aggregate of their salaries) | | |
| 5. Salaries of Truant Officers (number and aggregate of their salaries) | | |
| 6. *Salaries for Teaching:* | | |
| Number of Elementary School (Primary and Grammar) Teachers and aggregate of their salaries | | |
| Number of High School Teachers and aggregate of their salaries | | |
| Number of Kindergarten Teachers and aggregate of their salaries | | |
| Number of Evening School Teachers and aggregate of their salaries | | |
| Number of Truant School Teachers and aggregate of their salaries | | |
| Number of Teachers' Training School Teachers and aggregate of their salaries | | |
| Number of Special Teachers or supervisors of special subjects (Manual Training, Cooking, Sewing, Drawing, Music, Nature Study, Penmanship, Physical Education, etc.) and aggregate of their salaries | | |
| Number of Vacation School and Play Ground Teachers and aggregate of their salaries | | |
| What are the daily wages of (1) Carpenters, $..... (2) Bricklayers, $..... (3) Day Laborers, $..... in your city? | | |
| 7. Text-books, including copy- and drawing-books and repairs to books | | |
| 8. Supplies consumed by pupils (paper, pencils, ink, chalk, pens and pen-holders, erasers, laboratory, manual training, cooking, and kindergarten *supplies*, etc., etc.) | | |
| 9. Janitors' Supplies (brooms, brushes, towels and washing of towels, toilet paper, soap, etc., etc.) | | |
| 10. Supplies for Board of Education, Superintendents', and Principals' offices | | |

TEACHERS COLLEGE—*continued*

| | | |
|---|---|---|
| 11. Fuel | | |
| 12. Light and Power | | |
| 13. Water | | |
| 14. Ordinary repairs to Buildings and Grounds | | |
| 15. Rent | | |
| 16. School Census | | |
| 17. Transportation of Pupils | | |
| 18. Insurance | | |
| 19. Freight and Expressage | | |
| 20. Printing and Advertising | | |
| 21. Telegraph, Postage, etc. | | |
| 22. Telephone | | |
| 23. *Other Current Expenses:* | | |
| | | |
| | | |
| | | |
| Are books furnished free to indigents?.....to all students?.....What supplies are furnished free to indigents?..... | | |
| | | |
| | | |
| .....to all students?..... | | |
| | | |
| | | |
| **II. Plant and Permanent Equipment:** | | |
| 1. New buildings and sites, furniture and furnishings *for new buildings*, and permanent improvements to buildings and grounds | | |
| 2. Furniture (exclusive of that put in new buildings) | | |
| 3. Permanent equipment or apparatus (scientific apparatus, tools or apparatus for manual training and cooking, typewriters for commercial departments, maps, charts, globes, etc., etc.) | | |
| 4. Reference and Library Books | | |
| **III. Paid on Principal of Bonded Debt** | | |
| **IV. Paid on Principal of Loans** | | |
| **V. Paid for Interest** | | |
| **VI. All other Expenditures:** | | |
| (If important expenditures have been omitted in the above classification, will you kindly itemize such expenditures below.) | | |
| | | |
| | | |
| | | |
| *Total Expenditures for the year:* | | |
| **VII. Bonded School Debt at the end of the year** | | |
| **VIII. Paid for Evening Schools** [total current expenses, included in (I) above] | | |
| **IX. Paid for Teachers Training School** [total current expenses, included in (I) above] | | |

The study based upon the data collected, fifty-eight cities from which reports were received the first year and from thirty of the same cities for which a second year's report was received is summarized in the tables and diagrams which follow.[1]

Of the fifty-eight cities reporting the first year, thirty were able to report their total expenditure under the classification given, without resorting to the use of the ambiguous heading "miscellaneous." Of the remaining twenty-eight cities, sixteen reported less than 2% under the head "miscellaneous"; ten others reported less than 5%; and the remaining cities reported 5.14% and 6.75% for unclassified expenditures. For the second year, of the thirty cities reporting, eighteen report nothing under "miscellaneous"; and of the remaining twelve, eight report 1% or less, three 2%, and one 3.76% under this head.

In order to compare the expenditures in the different cities with but two years' data, it seemed best to base all comparisons upon the cost of maintenance and operation, that is, the expenditures which are absolutely necessary in order to keep the schools going, together with the amount spent for keeping the plant in proper repair. Under this head we included furniture put into old buildings, that is, new furniture put in to replace old; and also money spent for apparatus and for reference and library books. These expenditures, we believe, are properly classified as expenditures for maintenance and operation, since they seldom represent any very large increase in permanent equipment. In the printed form given above, they were placed under "plant and permanent equipment," because the writer believed that it was customary to place them there and that proper returns could be most easily secured by classifying them in this way. To have taken into consideration the amount spent for new buildings or grounds, or for permanent improvements, would have been

[1] The complete original data will be found in Strayer's "*City School Expenditures*" published by the Bureau of Publications, Teachers College, Columbia University.

unfair to some cities, because in some cases a much larger proportion of such expenditures is met by an issue of bonds than in others. The item of interest is not included in the cost of maintenance and operation for a similar reason. This item is sometimes included in the public school budget, while in other cases it is paid by the city. On this point the National Educational Association Committee on Uniform Financial Reports says:

"Expenditures seem to fall into three classes: the usual current expenditures necessary for the maintenance of schools; expenditures for sites, buildings, permanent improvements and equipment; other expenditures which, for various reasons, are not put in either of the two preceding classes.

"For the purpose of this report the first of these classes is by far the most important, for it would probably be conceded that from this item of current expense should be determined the cost of education per child, the most important item to be shown."[1]

After having determined the classification to be used, and that the total expenditures for maintenance and operation should serve as the basis for comparison, the question which next arises is, "How shall the separate items be compared as among the different cities?" It has been common to compare the expenditures for different cities on the basis of the cost per pupil in daily attendance. We shall use this method, and, in addition, it seems well to compare the different items on a slightly different basis, namely, the cost per pupil based upon a figure half-way between the average daily attendence and the average daily enrollment. In discussing this point, the National Educational Association Committee on Uniform Financial Reports says:

"For many reasons No. 39" (average number in daily membership, all schools) "seems the most suitable divisor. If computed in a uniform manner, the figures showing number in average daily membership would most nearly show the requirements for

[1] *Report of the National Education Association*, 1899, p. 347.

school rooms, furniture, supplies, and teachers. But it is not true that these figures are obtained by the same process, or based upon the same facts, in the different school systems. Usage varies so in computing membership in different schools—pupils in some cases being counted as members of the schools, when in other cities the same state of facts would cause the child to be considered as no longer a member of the school—that fair comparison is apparently not practicable by the use of this divisor.

"Your committee is of the opinion that a divisor as little subject to misunderstanding as possible, and one based upon facts which are obtained in the same way everywhere, is of the first importance. The members believe that this is provided by item 40, average number in daily attendance, all schools, and we have, therefore, made that item the divisor to be used, in connection with items 12 and 13, to obtain what shall be known as the 'cost of education.' "[1]

The school must provide teachers, buildings, and equipment for more than the average daily attendance, and yet it is seldom that provision is made for a number equal to the average daily enrollment. It seems, therefore, that the figure half-way between the two is a better figure than either of the others. It was impossible to secure the figures for the average daily enrollment in some cases, and for this reason the average cost per pupil for the first and second year will be based upon the average daily attendance, even though we do not believe it is so good a figure as the other.

Still another basis for comparison recommends itself—the apportionment of money spent for specific purposes expressed in per cents of the total expenditures for maintenance and operation. This last classification offers a particularly interesting basis for comparison and is entirely free from obscurity. The question is simply one of distribution of the money that is spent

[1] *Report of the National Educational Association*, 1899, pp. 349–352.

among the several items of the budget. Just as an individual may spend too much for clothes, for food, for books, or for amusement, in the same manner it is possible for a city to spend too great a proportion of its money for janitors, for fuel, for school supplies, or even for supervision.

TABLE 87

The average of the amounts spent for each item for two years expressed as per cents of the average total expenditure for two years. Thirty cities, for the school years 1902–03 and 1903–04.

| Number of City | Teaching and Supervision | Supervision | Janitors' Salaries | Teaching | Text-books and Supplies | Fuel | Repairs |
|---|---|---|---|---|---|---|---|
| 5 | 75.4 | 2.2 | 6.7 | 73.2 | 5.2 | 7.1 | .9 |
| 6 | 71.0 | 4.4 | 6.0 | 66.7 | 6.6 | 6.0 | 6.5 |
| 8 | 72.5 | 8.4 | 6.0 | 64.0 | 6.0 | 5.7 | 3.6 |
| 13 | 72.8 | 15.4 | 6.3 | 59.4 | 5.3 | 6.6 | 2.5 |
| 14 | 68.4 | 4.9 | 7.4 | 63.4 | 5.6 | 8.1 | 5.9 |
| 15 | 74.7 | 8.9 | 6.3 | 65.8 | 6.7 | 6.2 | 2.8 |
| 16 | 75.5 | 7.6 | 6.6 | 67.9 | 5.6 | 6.1 | 3.5 |
| 20 | 74.6 | 2.6 | 5.3 | 72.2 | 4.4 | 8.6 | 3.0 |
| 27 | 68.1 | 12.6 | 7.6 | 55.9 | 7.0 | 3.5 | 3.6 |
| 28 | 69.7 | 3.9 | 7.1 | 65.8 | 3.4 | | |
| 29 | 65.7 | 3.0 | 7.7 | 62.8 | 6.9 | 5.6 | 2.1 |
| 30 | 70.5 | 2.6 | 6.3 | 67.8 | | 4.6 | 8.3 |
| 31 | 64.0 | 2.7 | 6.6 | 61.2 | | 11.2 | 7.8 |
| 32 | 65.4 | 10.1 | 6.4 | 55.3 | 2.8 | 6.3 | 7.1 |
| 34 | 68.6 | 4.4 | 9.4 | 64.2 | | 6.8 | 3.3 |
| 35 | 76.7 | 3.8 | 5.7 | 72.9 | .3 | 5.9 | 3.8 |
| 36 | 80.8 | 17.2 | 3.6 | 62.6 | .7 | 5.8 | 1.2 |
| 37 | 76.2 | 17.2 | 5.2 | 59.2 | | 6.9 | 3.4 |
| 39 | 73.9 | 11.9 | 5.4 | 62.1 | | 6.5 | 4.1 |
| 40 | 68.1 | 11.1 | 3.8 | 57.0 | 6.1 | 7.3 | 3.6 |
| 41 | 70.0 | 9.1 | 4.5 | 60.9 | 5.6 | 6.7 | 1.8 |
| 42 | 69.8 | 15.7 | 5.2 | 54.1 | 9.1 | 5.1 | 3.1 |
| 43 | 72.0 | 3.3 | 6.4 | 68.7 | 3.3 | 5.9 | 2.7 |
| 45 | 71.2 | 4.3 | 5.5 | 66.9 | 6.1 | 3.9 | 5.9 |
| 48 | 68.5 | 12.1 | 5.7 | 57.4 | 6.3 | 5.6 | 2.7 |
| 52 | 62.4 | 6.1 | 6.4 | 56.2 | 7.3 | 3.6 | 9.8 |
| 54 | 65.4 | 11.3 | 5.4 | 54.0 | 13.2 | 4.8 | 3.5 |
| 55 | 69.2 | 4.8 | 5.6 | 64.4 | 5.8 | 5.1 | 2.0 |
| 56 | 71.2 | 10.3 | 8.3 | 60.9 | 3.8 | 4.4 | 4.4 |
| 57 | 74.5 | 9.7 | 5.1 | 64.8 | | 3.9 | 4.2 |

TABLE 88

The cost per pupil expressed in dollars and cents. The number used as a divisor is the figure half-way between the average daily attendance and the average daily enrollment. Forty-eight cities, for the school year 1902–03.

| Number of City | Total | Teaching | Supervision | Clerk | Janitors | Truant Officers | Text-books | Supplies | Janitors' Supplies | Board of Education and Supervisors' Supplies | Fuel | Light and Power | Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 34.18 | 21.38 | .99 | .17 | 2.26 | .14 | 1.75 | 1.13 | .30 | .03 | 1.56 | .16 | |
| 2 | 26.48 | 16.69 | .88 | .07 | | .15 | 1.17 | .29 | .13 | | 4.39 | .12 | .06 |
| 3 | 27.09 | 18.47 | 1.08 | | 1.91 | | | 1.66 | .27 | | 1.27 | | |
| 4 | 30.91 | 19.73 | 3.33 | .11 | 2.21 | .08 | 1.05 | .89 | .22 | | 1.48 | .07 | .12 |
| 5 | 32.30 | 23.70 | .72 | .17 | 2.13 | .25 | | 1.94 | .05 | .08 | 1.97 | .16 | |
| 6 | 26.80 | 19.50 | 1.12 | | 1.41 | | | 1.75 | .05 | .03 | 1.10 | .07 | |
| 7 | 21.19 | 12.65 | 1.68 | .10 | 2.01 | .18 | .53 | .79 | .18 | | .78 | | |
| 8 | 29.80 | 17.29 | 4.04 | | 1.81 | .37 | 1.48 | .44 | .05 | .10 | 1.74 | .05 | .10 |
| 9 | 29.29 | 19.50 | .82 | .32 | 2.19 | .15 | | 1.96 | | | 2.75 | | .16 |
| 10 | 41.21 | 30.40 | .70 | .28 | 2.44 | .19 | .95 | 1.34 | .10 | .17 | 1.75 | .08 | .22 |
| 11 | 27.90 | 13.90 | 3.23 | .31 | 2.56 | .31 | | 1.88 | | | 1.70 | .17 | |
| 12 | 28.28 | 18.12 | 2.58 | | 2.14 | .07 | .82 | | 1.06 | | 1.99 | | |
| 13 | 28.53 | 15.33 | 4.96 | .18 | 1.96 | .27 | .74 | .81 | .07 | | 1.88 | .05 | 1.6 |
| 14 | 27.35 | 17.02 | 1.37 | | 1.86 | .07 | .85 | .68 | .07 | | 2.24 | .14 | |
| 15 | 24.33 | 17.20 | .52 | .12 | 1.47 | .04 | .97 | .97 | .06 | | 1.64 | .07 | |
| 16 | 27.67 | 18.65 | 2.16 | | 1.77 | .38 | .80 | .92 | | | 1.40 | | |
| 17 | 34.88 | 21.90 | 2.73 | .21 | 2.45 | .14 | 1.02 | 1.07 | | .01 | 2.56 | .28 | |
| 18 | 34.59 | 24.39 | 1.55 | | 2.35 | .08 | | 2.62 | | | 2.23 | | |
| 19 | 27.78 | 17.50 | .95 | .18 | 1.90 | .04 | 1.32 | .79 | | | 2.00 | | .11 |
| 20 | 22.53 | 16.13 | .48 | | 1.16 | .15 | .54 | .35 | .04 | | 2.23 | .03 | .20 |
| 28 | 28.44 | 18.55 | 1.11 | .36 | 2.05 | .18 | | 1.07 | | | 2.14 | | 1.29 |
| 29 | 27.91 | 17.20 | .81 | | 1.95 | .09 | | 1.91 | .32 | | 1.43 | .01 | .08 |

TABLE 88 (*Continued*)

The cost per pupil expressed in dollars and cents. The number used as a divisor is the figure half-way between the average daily attendance and the average daily enrollment. Forty-eight cities, for the school year 1902–03.

| Number of City | Repairs | Rent | School Census | Transportation of Pupils | Insurance | Freight and Expressage | Printing and Advertising | Telegraph, Postage, etc. | Telephones | Miscellaneous Expenses | Furniture (not put in new buildings) | Apparatus | Reference and Library Books |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.80 | .01 | .24 | .70 | | .15 | .10 | .02 | .10 | .56 | .14 | .45 | .02 |
| 2 | 1.42 | .04 | .04 | .90 | | | | | .01 | | .13 | .07 | |
| 3 | 1.05 | | | | | | | | | 1.23 | .14 | | |
| 4 | 1.03 | .05 | .02 | | | .05 | .03 | .01 | .09 | | .10 | .26 | |
| 5 | .32 | | .10 | .34 | | | | | .01 | | .10 | .16 | .08 |
| 6 | 1.06 | | | .40 | .05 | .04 | .01 | .01 | | | | .19 | |
| 7 | 1.40 | | .02 | .44 | .18 | .03 | .09 | .01 | | | .06 | | |
| 8 | 1.12 | | .05 | .54 | .18 | .04 | .07 | .02 | .03 | | .12 | .07 | .05 |
| 9 | .04 | | .04 | | | | | | .02 | 1.34 | | | |
| 10 | 2.18 | | .05 | .18 | | | .10 | | .01 | | | | |
| 11 | 1.19 | .14 | | .26 | .26 | .03 | .04 | | .05 | 1.89 | .07 | | |
| 12 | 9.9 | .06 | .04 | .27 | | .04 | | | .06 | | | | |
| 13 | .74 | .04 | .03 | .14 | .46 | .05 | .05 | .01 | | .36 | .13 | .06 | .01 |
| 14 | 1.93 | .03 | .02 | .44 | | .09 | .05 | | | .16 | .20 | .10 | .05 |
| 15 | .67 | .17 | .03 | .21 | | .03 | .05 | .01 | .01 | | .02 | .07 | .01 |
| 16 | 1.11 | | .05 | .10 | | | | | | | | | |
| 17 | 1.39 | | .03 | .35 | | .07 | .12 | .01 | .03 | .08 | .12 | .24 | .07 |
| 18 | .95 | .05 | | .24 | | .04 | .08 | .02 | .02 | | | | |
| 19 | 1.58 | | .06 | .79 | | .05 | .05 | .01 | .01 | | .16 | .34 | |
| 20 | .83 | .08 | | .07 | | | .05 | | .01 | .21 | | | |
| 28 | | .13 | .12 | | | | | | .05 | .83 | .22 | .33 | |
| 29 | | 2.98 | .06 | .34 | .13 | .10 | | | | | | .33 | .17 |

TABLE 88 (*Continued*)

The cost per pupil expressed in dollars and cents. The number used as a divisor is the figure half-way between the average daily attendance and the average daily enrollment. Forty-eight cities, for the school year 1902–03.

| Number of City | Total | Teaching | Supervision | Clerk | Janitors | Truant Officers | Text-books | Supplies | Janitors' Supplies | Board of Education and Supervisors' Supplies | Fuel | Light and Power | Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 35.41 | 23.92 | .96 | .26 | 2.24 | .32 | .61 | .98 | .24 | | 1.75 | .07 | |
| 31 | 26.82 | 15.20 | .76 | .27 | 1.77 | .30 | 1.50 | | | | 3.36 | .09 | |
| 32 | 33.50 | 18.52 | 1.25 | .29 | 1.88 | .17 | .36 | .63 | .13 | .63 | 2.19 | .25 | |
| 33 | 24.13 | 16.31 | 3.08 | .34 | 1.48 | .09 | | .17 | .04 | .03 | 1.20 | .04 | |
| 34 | 35.20 | 22.65 | 1.52 | .42 | 2.82 | .55 | .02 | .32 | .21 | .14 | 3.54 | .08 | |
| 35 | 24.08 | 17.55 | .48 | .17 | 1.57 | .17 | .02 | | .09 | .06 | 1.36 | .06 | |
| 37 | 18.55 | 10.96 | 3.13 | .37 | .98 | .09 | | .38 | | | 1.11 | | |
| 38 | 22.68 | 14.65 | 1.69 | | .87 | .37 | .05 | .09 | .15 | .05 | 1.25 | | |
| 39 | 30.87 | 19.24 | 3.42 | .30 | 1.61 | .24 | | .54 | .24 | | 2.03 | | |
| 40 | 33.61 | 21.08 | 1.36 | .43 | 1.33 | .28 | .58 | 1.40 | .11 | | 2.95 | | .24 |
| 41 | 23.77 | 15.41 | 1.00 | .44 | 1.09 | .02 | 1.35 | | .03 | .01 | 1.44 | .11 | .21 |
| 42 | 28.23 | 15.31 | 4.39 | .32 | 1.48 | .32 | 1.42 | 1.11 | .16 | | 1.58 | | .32 |
| 43 | 25.14 | 16.39 | .89 | .16 | 1.67 | .20 | .47 | .43 | .17 | .03 | 2.23 | .09 | .15 |
| 44 | 25.50 | 16.22 | 1.16 | .16 | 1.54 | .22 | .30 | | .03 | .39 | 2.55 | .12 | .21 |
| 45 | 27.14 | 18.20 | .61 | .05 | 1.45 | .18 | 1.48 | .33 | .08 | .05 | 1.03 | .25 | |
| 46 | 39.40 | 24.23 | 4.47 | .29 | 1.81 | .20 | 1.13 | .68 | .37 | .18 | 1.55 | .05 | .13 |
| 47 | 18.33 | 5.11 | 2.98 | .66 | 1.55 | .16 | .61 | | .51 | | 2.95 | .11 | .04 |
| 48 | 21.09 | 12.28 | 2.06 | .23 | 1.26 | .28 | .90 | .29 | .05 | .04 | 1.29 | .05 | .11 |
| 49 | 20.93 | 13.40 | 2.54 | .14 | .85 | .28 | 1.09 | .21 | .14 | .07 | 1.15 | | .04 |
| 51 | 29.83 | 19.60 | 4.14 | .30 | 1.63 | .20 | .56 | .14 | .07 | .02 | 1.76 | .03 | |
| 53 | 29.61 | 19.82 | 3.62 | .21 | 2.04 | | | 1.44 | | .29 | | .83 | |
| 54 | 52.75 | 35.07 | 5.64 | .67 | 2.92 | | 2.02 | 2.40 | .42 | .17 | 2.61 | .56 | |
| 55 | 19.61 | 12.08 | .66 | .11 | 1.04 | .22 | | 1.09 | | | 1.09 | .11 | |
| 56 | 27.12 | 14.82 | 4.42 | .22 | 2.28 | .08 | .43 | .50 | .32 | .46 | 1.18 | .11 | |
| 57 | 51.49 | 33.36 | 5.11 | .96 | 2.43 | | 1.35 | 2.24 | .11 | .11 | 2.02 | .22 | |
| 58 | 20.38 | 12.83 | 1.97 | .13 | 1.11 | | | 1.32 | .26 | .13 | .66 | .05 | .09 |

TABLE 88 (*Continued*)

The cost per pupil expressed in dollars and cents. The number used as a divisor is the figure half-way between the average daily attendance and the average daily enrollment. Forty-eight cities, for the school year 1902–03.

| Number of City | Repairs | Rent | School Census | Transportation of Pupils | Insurance | Freight and Expressage | Printing and Advertising | Telegraph, Postage, etc. | Telephones | Miscellaneous Expenses | Furniture (not put in new buildings) | Apparatus | Reference and Library Books |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 2.61 | | .02 | | | | .21 | | .11 | .30 | .33 | .06 | .40 |
| 31 | 1.72 | .17 | .10 | | .07 | .14 | .14 | | .04 | .97 | .34 | 1.7 | |
| 32 | 3.56 | | .13 | | .18 | .27 | .27 | | .10 | 1.26 | .83 | .21 | .63 |
| 33 | 1.13 | | .07 | | .06 | .06 | .06 | .02 | | .02 | | | |
| 34 | .51 | | .19 | .18 | .51 | .43 | .43 | | .07 | .17 | .60 | .23 | |
| 35 | .67 | | .04 | | .09 | .16 | .16 | .02 | .06 | .97 | .14 | 16 | .21 |
| 37 | .43 | | | | .04 | .11 | .11 | | | .61 | | .32 | |
| 38 | 2.23 | | .05 | | .26 | .02 | .14 | .02 | | .30 | .05 | .18 | .28 |
| 39 | 1.31 | | | | .06 | | .56 | | .04 | | | | 1.31 |
| 40 | 1.17 | | .04 | | .49 | .03 | .68 | | | .43 | .17 | .73 | |
| 41 | .04 | .43 | .05 | .02 | .17 | .05 | .06 | .04 | .05 | 1.22 | .14 | .35 | |
| 42 | .79 | | | | .32 | .02 | .08 | .02 | .05 | | .32 | .16 | .10 |
| 43 | .62 | .04 | .10 | .07 | .01 | .01 | .12 | .02 | .01 | .70 | .17 | .21 | .16 |
| 44 | 1.09 | .59 | | | .31 | .05 | .07 | .01 | | | .15 | 18 | .10 |
| 45 | 1.88 | | | | .30 | .03 | .24 | | .03 | .65 | .12 | .05 | .13 |
| 46 | 1.02 | 1.42 | | .10 | | .07 | .21 | .04 | .18 | .04 | .55 | .22 | .24 |
| 47 | 2.42 | .12 | | | .33 | | .21 | | .06 | | .37 | .03 | .11 |
| 48 | .31 | .51 | .06 | | 10 | .03 | .33 | .01 | | .68 | .08 | .05 | .06 |
| 49 | .28 | | .05 | | .12 | .04 | .02 | .01 | | .06 | .19 | .19 | .10 |
| 51 | .56 | | .02 | | .27 | .02 | .06 | .01 | .04 | | .03 | .23 | .23 |
| 53 | .96 | | | | | | | | | | .41 | | |
| 54 | 2.21 | | | .24 | .42 | .19 | .24 | .03 | .19 | .64 | .24 | 1.17 | .19 |
| 55 | .55 | | | | | | | | | 1.92 | .27 | .27 | .22 |
| 56 | 1.45 | | | | .15 | | .08 | | .06 | .24 | .16 | .05 | .10 |
| 57 | 2.24 | | | | .11 | .11 | .14 | .07 | | | .45 | .22 | .22 |
| 58 | 1.06 | .22 | | | .03 | | .03 | | .05 | | | .03 | .40 |

TABLE 89

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Fifty-seven cities, for the school year 1902–03.

| Number of City | Total | Teaching | Supervision | Clerk | Janitors | Truant Officers | Text-books | Supplies | Janitors' Supplies | Board of Education and Supervisors' Supplies | Fuel | Light and Power | Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 35.64 | 22.30 | 1.03 | .18 | 2.35 | .14 | 1.83 | 1.18 | .31 | .04 | 1.63 | .17 | |
| 2 | 28.00 | 17.60 | .93 | .07 | | .16 | 1.24 | .31 | .14 | | 4.70 | .13 | .07 |
| 3 | 28.06 | 19.10 | 1.12 | | 1.98 | | | 1.72 | .28 | | 1.32 | | |
| 4 | 31.90 | 20.35 | 3.44 | .11 | 2.27 | .08 | 1.08 | .92 | .22 | | 1.53 | .07 | .12 |
| 5 | 33.27 | 24.41 | .74 | .18 | 2.19 | .26 | | 1.99 | .06 | .08 | 2.03 | .16 | |
| 6 | 27.65 | 20.10 | 1.15 | | 1.45 | | | 1.81 | .05 | .03 | 1.14 | .07 | |
| 7 | 21.61 | 12.91 | 1.71 | .11 | 2.05 | .18 | .54 | .81 | .18 | | .80 | | |
| 8 | 31.16 | 18.10 | 4.23 | | 1.89 | .39 | 1.55 | .46 | .05 | .10 | 1.82 | .05 | .10 |
| 9 | 31.01 | 20.63 | .86 | .33 | 2.32 | .15 | | 2.08 | | | 2.91 | | .17 |
| 10 | 43.23 | 31.91 | .73 | .29 | 2.56 | .20 | .99 | 1.39 | .12 | .18 | 1.84 | .11 | .23 |
| 11 | 29.01 | 14.42 | 3.35 | .32 | 2.65 | .32 | | 1.94 | | | 1.77 | .18 | |
| 12 | 29.20 | 18.75 | 2.60 | | 2.21 | .07 | .85 | | 1.09 | | 2.05 | | |
| 13 | 29.56 | 15.90 | 5.14 | .19 | 2.03 | .28 | .77 | .83 | .07 | | 1.95 | .05 | .16 |
| 14 | 28.75 | 17.89 | 1.44 | | 1.95 | .07 | .89 | .71 | .08 | | 2.50 | | |
| 15 | 25.35 | 17.91 | .55 | .12 | 1.53 | .04 | 1.01 | 1.01 | .07 | | 1.71 | .07 | |
| 16 | 28.41 | 19.17 | 2.22 | | 1.82 | .39 | .82 | .94 | | | 1.44 | | .33 |
| 17 | 36.00 | 22.60 | 2.82 | .22 | 2.53 | .14 | 1.05 | 1.11 | | .01 | 2.64 | .29 | |
| 18 | 35.70 | 25.17 | 1.60 | | 2.43 | .08 | | 2.71 | | | 2.30 | | |
| 19 | 28.90 | 18.16 | .98 | .19 | 1.97 | .04 | 1.37 | .82 | | | 2.08 | | .11 |
| 20 | 23.16 | 16.58 | .49 | | 1.19 | .15 | .55 | .36 | .04 | | 2.29 | .03 | .21 |
| 21 | 24.50 | 16.90 | 3.08 | .05 | 1.44 | .05 | | .38 | .09 | .05 | .94 | .05 | .04 |
| 22 | 8.94 | 6.63 | .11 | | .37 | | | .53 | .13 | .02 | .37 | .03 | |
| 23 | 12.85 | 3.69 | 3.78 | .08 | 1.92 | .08 | | | | | 1.27 | | .08 |
| 24 | 15.26 | 9.87 | 1.41 | .23 | .96 | | .10 | .22 | .01 | .01 | 1.03 | .07 | .14 |
| 25 | 31.00 | 21.67 | 2.45 | | 1.53 | | .11 | .11 | .03 | .05 | 2.04 | .04 | .25 |
| 26 | 32.67 | 18.37 | 5.47 | .19 | 1.92 | .03 | .66 | .99 | .04 | .03 | 1.45 | .05 | .18 |
| 27 | 26.96 | 15.11 | 2.82 | | 1.95 | | 1.64 | | .48 | | 1.25 | | .12 |
| 28 | 30.30 | 19.77 | 1.19 | .39 | 2.19 | .20 | | 1.14 | | | 2.28 | | 1.38 |
| 29 | 29.50 | 18.21 | .86 | | 2.06 | .09 | | 2.01 | .33 | | 1.51 | .01 | .08 |

TABLE 89 (*Continued*)

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Fifty-seven cities, for the school year 1902–03.

| Number of City | Repairs | Rent | School Census | Transportation of Pupils | Insurance | Freight and Expressage | Printing and Advertising | Telegraph, Postage, etc. | Telephones | Miscellaneous Expenses | Furniture (not put in new buildings) | Apparatus | Reference and Library Books | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.88 | .01 | .25 | .73 | | .16 | .11 | .02 | .10 | .16 | .56 | .47 | .02 | |
| 2 | 1.50 | .05 | .05 | .83 | | | | | .01 | | .14 | .07 | | |
| 3 | 1.09 | | | | | | | | | 1.28 | .15 | | | |
| 4 | 1.06 | .05 | .02 | | | .05 | .04 | .01 | .09 | | .11 | .27 | | |
| 5 | .33 | | .11 | .34 | | | | | .01 | | .11 | .16 | .08 | |
| 6 | 1.09 | | | .41 | | .05 | .04 | .01 | .01 | | | .19 | | |
| 7 | 1.43 | | .02 | .45 | .19 | .03 | .11 | .01 | | | .06 | | | |
| 8 | 1.17 | | .05 | .56 | .19 | .04 | .08 | .03 | .03 | | .13 | .08 | .05 | |
| 9 | .05 | | .05 | | | | | | .03 | 1.42 | | | | |
| 10 | 2.29 | | .05 | .19 | | | .10 | | .01 | | | | | |
| 11 | 1.24 | .14 | | .26 | .26 | .04 | .04 | .01 | .05 | 1.96 | .07 | | | |
| 12 | 1.03 | .07 | .04 | .28 | | .04 | | | .06 | | | | | |
| 13 | .77 | .04 | .03 | .14 | .48 | .05 | .05 | .01 | | .37 | .14 | .06 | .01 | |
| 14 | 2.02 | .03 | .03 | .46 | | .10 | .05 | | | .17 | .21 | .10 | .05 | |
| 15 | .69 | .17 | .03 | .22 | | .03 | .06 | .01 | .01 | | .02 | .07 | .01 | |
| 16 | 1.14 | | .05 | .10 | | | | | | | | | | |
| 17 | 1.43 | | .03 | .36 | | .07 | .12 | .01 | .02 | .08 | .12 | .25 | .07 | |
| 18 | .98 | | .05 | .25 | | .04 | .08 | .02 | .02 | | | | | |
| 19 | 1.64 | | .07 | .82 | | 05 | .05 | .01 | .01 | | .16 | .35 | | |
| 20 | .85 | .09 | | .07 | | | .05 | | .01 | .22 | | | | |
| 21 | .94 | | | | .14 | .02 | .01 | .01 | .01 | | .19 | | .07 | |
| 22 | .59 | .01 | .02 | | | .01 | .06 | | | | | | .08 | |
| 23 | .90 | | .06 | .03 | .40 | | | | .01 | | .19 | .08 | .26 | |
| 24 | .45 | | .03 | | 32 | | .05 | .01 | .02 | .19 | | | .13 | |
| 25 | 1.83 | | .08 | | .25 | .01 | .25 | .01 | .14 | | | | .05 | .11 |
| 26 | 1.12 | .19 | .10 | .03 | .44 | .03 | .10 | 02 | .01 | | | | .17 | 1.05 |
| 27 | .63 | .54 | .10 | | .03 | | .08 | | | 1.18 | .24 | .44 | .27 | |
| 28 | | .14 | .13 | | | | | | .05 | .89 | .23 | | .35 | |
| 29 | | 3.15 | .07 | .36 | | .14 | .11 | | | | | | .35 | .18 |

TABLE 89 (*Continued*)

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Fifty-seven cities, for the school year 1902–03.

| Number of City | Total | Teaching | Supervision | Clerk | Janitors | Truant Officers | Text-books | Supplies | Janitors' Supplies | Board of Education and Supervisors' Supplies | Fuel | Light and Power | Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 37.32 | 25.25 | 1.01 | .27 | 2.36 | .34 | .64 | 1.04 | .26 | | 1.85 | .07 | |
| 31 | 27.90 | 15.75 | .79 | .28 | 1.84 | .32 | 1.56 | | | | 3.49 | .09 | |
| 32 | 34.49 | 19.07 | 1.29 | .30 | 1.93 | .17 | .37 | .64 | .13 | .64 | 2.25 | .25 | |
| 33 | 24.85 | 16.78 | 3.18 | .35 | 1.52 | .09 | | .17 | .04 | .03 | 1.24 | .04 | |
| 34 | 35.96 | 23.15 | 1.56 | .44 | 2.92 | .56 | .02 | .33 | .22 | .09 | 3.61 | .08 | |
| 35 | 24.52 | 17.87 | .49 | .17 | 1.60 | .18 | .02 | | .10 | .06 | 1.39 | .07 | |
| 36 | 31.94 | 18.88 | 5.54 | .25 | 1.11 | .10 | | .21 | .07 | .02 | 1.66 | .22 | .18 |
| 37 | 19.26 | 11.40 | 3.25 | .39 | 1.01 | .09 | | .40 | | | 1.15 | | |
| 38 | 23.56 | 15.21 | 1.75 | | .91 | .40 | .05 | .10 | .15 | .05 | 1.30 | | |
| 39 | 32.01 | 19.94 | 3.55 | .31 | 1.67 | .25 | | .56 | .25 | | 2.11 | | |
| 40 | 34.79 | 21.90 | 1.42 | .44 | 1.38 | .29 | .60 | 1.45 | .11 | | 3.06 | | .25 |
| 41 | 24.65 | 15.99 | 1.03 | .46 | 1.13 | .02 | 1.40 | | .04 | .01 | 1.49 | .12 | .22 |
| 42 | 28.50 | 15.47 | 4.43 | .32 | 1.49 | .32 | 1.43 | 1.12 | .16 | | 1.59 | | .32 |
| 43 | 26.09 | 17.00 | .92 | .17 | 1.73 | .21 | .49 | .45 | .18 | .03 | 2.31 | .10 | .15 |
| 44 | 26.18 | 16.69 | 1.19 | .16 | 1.58 | .23 | .31 | | .03 | .40 | 2.62 | .13 | .21 |
| 45 | 28.53 | 19.14 | .64 | .05 | 1.53 | .19 | 1.55 | .35 | .08 | .05 | 1.08 | .26 | |
| 46 | 41.52 | 25.53 | 4.71 | .31 | 1.91 | .21 | 1.19 | .72 | 39 | .19 | 1.63 | .05 | .14 |
| 47 | 20.71 | 5.78 | 3.37 | .75 | 1.75 | .18 | .69 | | .57 | | 3.34 | .12 | .04 |
| 48 | 22.75 | 13.29 | 2.23 | .25 | 1.36 | .30 | .97 | .31 | .05 | .04 | 1.39 | .05 | .12 |
| 49 | 22.20 | 14.20 | 2.69 | .15 | .89 | .30 | 1.15 | .22 | .15 | .08 | 1.22 | | .04 |
| 51 | 32.05 | 21.05 | 4.45 | .32 | 1.76 | .21 | .59 | .15 | .15 | .02 | 1.79 | .04 | |
| 52 | 26.30 | 13.81 | 1.75 | .19 | 1.84 | .16 | .79 | .92 | .16 | .12 | | 1.19 | |
| 53 | 30.61 | 20.49 | 3.74 | .21 | 2.11 | | | 1.49 | | .29 | | .85 | |
| 54 | 54.72 | 30.60 | 5.87 | .69 | 3.05 | | 2.11 | 2.50 | .43 | .18 | 2.72 | .58 | |
| 55 | 20.50 | 12.61 | .69 | .11 | 1.09 | .23 | | 1.14 | | | 1.14 | .11 | |
| 56 | 28.01 | 15.33 | 4.56 | .22 | 2.35 | .08 | .45 | .52 | .33 | .47 | 1.22 | .11 | |
| 57 | 51.25 | 33.20 | 5.09 | .96 | 2.42 | | 1.34 | 2.23 | .11 | .11 | 2.01 | .22 | |
| 58 | 21.51 | 13.55 | 2.08 | .14 | 1.17 | | | 1.39 | .28 | .14 | .69 | .06 | .10 |

TABLE 89 (*Continued*)

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Fifty-seven cities, for the school year 1902–03.

| Number of City | Repairs | Rent | School Census | Transportation of Pupils | Insurance | Freight and Expressage | Printing and Advertising | Telegraph, Postage, etc. | Telephones | Miscellaneous Expenses | Furniture (not put in new buildings) | Apparatus | Reference and Library Books |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 2.75 | | .02 | | | .31 | .22 | | .12 | | .34 | .07 | .42 |
| 31 | 1.79 | .10 | .11 | | .08 | | .15 | | .04 | 1.01 | .35 | .18 | |
| 32 | 3.67 | | .13 | | .18 | .06 | .27 | | .10 | 1.29 | .86 | .21 | .65 |
| 33 | 1.17 | | .07 | | .06 | .01 | .06 | .03 | | .02 | | | |
| 34 | .52 | | .19 | .18 | .52 | | .44 | | .07 | .17 | .61 | .23 | |
| 35 | .68 | | .04 | | .09 | .02 | .16 | .02 | .06 | .99 | .14 | .16 | .21 |
| 36 | .72 | | .10 | | .33 | .06 | .02 | .02 | .08 | 1.57 | .41 | .19 | .27 |
| 37 | .45 | | | | .04 | | .11 | | | .63 | | .33 | |
| 38 | 2.32 | | .05 | | .27 | .02 | .14 | .02 | | .31 | .05 | .18 | .29 |
| 39 | 1.36 | | | | .06 | | .59 | | .04 | | | | 1.36 |
| 40 | 1.21 | | .05 | | .51 | .03 | .70 | | | .45 | .18 | .76 | |
| 41 | .04 | .45 | .06 | .03 | .17 | .05 | .06 | .04 | .05 | 1.27 | .15 | .36 | |
| 42 | .80 | | | | .32 | .02 | .08 | .02 | .05 | | .32 | .16 | .10 |
| 43 | .65 | .04 | .11 | .07 | .01 | .01 | .13 | .02 | .01 | .69 | .17 | .22 | .17 |
| 44 | 1.12 | .60 | | | .32 | .05 | .07 | .01 | | | .15 | .18 | .10 |
| 45 | 1.98 | | | | .32 | .04 | .25 | | .03 | .68 | .13 | .05 | .14 |
| 46 | 1.07 | 1.49 | | .11 | | .08 | .22 | .04 | .19 | .04 | .58 | .23 | .25 |
| 47 | 2.03 | .14 | | | .37 | | .23 | | .07 | | .42 | .04 | .13 |
| 48 | .34 | .56 | .06 | | .11 | .04 | .36 | .01 | | .73 | .08 | .05 | .06 |
| 49 | .29 | | .05 | | .13 | .04 | .03 | .01 | | .06 | .20 | .20 | .11 |
| 51 | .59 | | .02 | | .29 | .02 | .06 | .01 | .05 | | .03 | .25 | .25 |
| 52 | 3.95 | | | | .31 | .18 | .21 | | .03 | .47 | | .26 | .05 |
| 53 | 1.00 | | | | | | | | | | .42 | | |
| 54 | 2.30 | | | .25 | .43 | .20 | .25 | .04 | .20 | .66 | .25 | 1.21 | .20 |
| 55 | .57 | | | | | | | | | 2.01 | .29 | .29 | .23 |
| 56 | 1.50 | | | | .16 | | .08 | | .07 | .25 | .17 | .06 | .11 |
| 57 | 2.23 | | | | .11 | .11 | .13 | .07 | | | .45 | .22 | .22 |
| 58 | 1.12 | .24 | | | .03 | | .03 | | .06 | | | .03 | .42 |

TABLE 90

The cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor. Thirty of the cities which reported in 1902–03 reporting for the year 1903–04.

| Number of City | Total | Teaching and Supervision | Teaching | Supervision | Janitors' Salaries | Text-books and Supplies | Fuel | Repairs |
|---|---|---|---|---|---|---|---|---|
| 5 | 34.08 | 25.51 | 24.77 | .74 | 2.31 | 1.29 | 2.75 | .33 |
| 6 | 24.26 | 15.80 | 14.66 | 1.14 | 1.61 | 1.63 | 1.91 | 2.18 |
| 8 | 32.36 | 23.65 | 22.58 | 1.07 | 1.86 | 1.83 | 1.78 | 1.12 |
| 13 | 34.21 | 25.52 | 20.91 | 4.61 | 1.94 | 1.82 | 2.25 | .82 |
| 14 | 28.79 | 19.96 | 18.58 | 1.38 | 2.28 | 1.63 | | 1.36 |
| 15 | 24.65 | 18.71 | 14.88 | 3.83 | 1.57 | 1.36 | 1.44 | .69 |
| 16 | 28.18 | 21.32 | 19.23 | 2.09 | 1.90 | 1.51 | 1.99 | .82 |
| 20 | 23.06 | 17.40 | 16.71 | .69 | 1.26 | 1.21 | 1.94 | .55 |
| 27 | 26.25 | 18.23 | 14.57 | 3.67 | 2.07 | 1.62 | .58 | .97 |
| 28 | 29.38 | 20.63 | 19.50 | 1.13 | 2.08 | .87 | 3.94 | |
| 29 | 24.72 | 15.54 | 15.78 | .76 | 2.08 | 1.97 | 1.49 | 1.26 |
| 30 | 38.70 | 26.99 | 26.00 | .99 | 2.42 | | 1.67 | 3.57 |
| 31 | 30.92 | 21.17 | 20.37 | .80 | 2.04 | | 3.12 | 2.82 |
| 32 | 28.00 | 20.11 | 15.52 | 4.59 | 2.04 | .78 | 1.69 | 1.02 |
| 34 | 31.54 | 21.62 | 20.23 | 1.39 | 3.37 | | 1.13 | 1.61 |
| 35 | 29.93 | 23.40 | 21.75 | 1.65 | 1.43 | .14 | 1.90 | 1.47 |
| 36 | 31.70 | 26.49 | 21.20 | 5.29 | 1.16 | | 2.04 | .04 |
| 37 | 20.71 | 15.76 | 12.15 | 3.61 | 1.08 | | 1.63 | .94 |
| 39 | 28.78 | 21.46 | 17.80 | 3.66 | 1.59 | | | 1.15 |
| 40 | 31.14 | 21.35 | 15.72 | 5.63 | 1.14 | 2.03 | | 1.17 |
| 41 | 25.34 | 17.94 | 14.37 | 3.57 | 1.15 | 1.40 | 1.86 | .91 |
| 42 | 29.09 | 20.32 | 15.72 | 4.60 | 1.50 | 2.68 | 1.38 | .98 |
| 43 | 30.49 | 22.94 | 22.01 | .93 | 1.92 | .92 | .94 | .89 |
| 45 | 29.07 | 21.22 | 19.38 | 1.84 | 1.67 | 1.61 | 1.18 | 1.47 |
| 48 | 27.72 | 19.66 | 15.67 | 3.99 | 1.51 | 1.97 | 1.41 | 1.07 |
| 52 | 29.02 | 19.08 | 17.45 | 1.63 | 2.30 | 2.11 | 1.09 | 1.37 |
| 54 | 48.22 | 30.98 | 25.20 | 5.78 | 2.56 | 8.70 | | 1.36 |
| 55 | 17.91 | 13.19 | 12.07 | 1.12 | 1.06 | 1.09 | .84 | .22 |
| 56 | 30.93 | 22.22 | 20.85 | 1.37 | 2.58 | 1.30 | 1.36 | 1.12 |
| 57 | 52.48 | 39.10 | 34.07 | 5.03 | 2.94 | 3.22 | 2.07 | 2.18 |

TABLE 91

The average cost per pupil for two school years, 1902–03 and 1903–04. This table is derived from Tables 89 and 90 which are based on the average number of pupils in daily attendance. Thirty cities.

| Number of City | Total | Teaching and Supervision | Teaching | Supervision | Janitors' Salaries | Text-books and Supplies | Fuel | Repairs |
|---|---|---|---|---|---|---|---|---|
| 5 | 33.67 | 25.33 | 24.59 | .74 | 2.25 | 1.64 | 2.39 | .33 |
| 6 | 25.95 | 18.52 | 17.38 | 1.14 | 1.53 | 1.72 | 1.52 | 1.63 |
| 8 | 31.76 | 22.99 | 20.34 | 2.65 | 1.87 | 1.92 | 1.80 | 1.14 |
| 13 | 31.88 | 23.28 | 18.40 | 4.88 | 1.98 | 1.71 | 2.10 | .79 |
| 14 | 28.77 | 19.64 | 18.23 | 1.41 | 2.11 | 1.62 | 2.48 | 1.69 |
| 15 | 25.00 | 18.58 | 16.39 | 2.19 | 1.55 | 1.69 | 1.57 | .69 |
| 16 | 28.39 | 21.35 | 19.20 | 2.15 | 1.86 | 1.63 | 1.71 | .98 |
| 20 | 23.11 | 17.23 | 16.64 | .59 | 1.22 | 1.06 | 2.12 | .70 |
| 27 | 26.10 | 18.08 | 14.84 | 3.25 | 2.01 | 1.63 | .91 | .85 |
| 28 | 29.84 | 20.79 | 19.63 | 1.16 | 2.13 | 1.00 | | |
| 29 | 27.11 | 17.80 | 16.99 | .81 | 2.07 | 1.99 | 1.50 | 1.26 |
| 30 | 38.01 | 26.62 | 25.62 | 1.00 | 2.39 | | 1.76 | 3.16 |
| 31 | 29.41 | 18.85 | 18.06 | .79 | 1.94 | | 3.30 | 2.30 |
| 32 | 31.24 | 20.23 | 17.29 | 2.94 | 1.98 | .89 | 1.97 | 2.34 |
| 34 | 33.75 | 25.16 | 21.69 | 1.47 | 3.14 | | 2.37 | 1.06 |
| 35 | 27.22 | 20.88 | 19.81 | 1.07 | 1.51 | | 1.14 | 1.07 |
| 36 | 31.82 | 25.45 | 20.04 | 5.41 | 1.13 | | 1.85 | .38 |
| 37 | 19.98 | 15.20 | 11.77 | 3.43 | 1.04 | | 1.39 | .69 |
| 39 | 30.39 | 22.47 | 18.87 | 3.60 | 1.63 | | 1.99 | 1.25 |
| 40 | 32.96 | 22.33 | 18.81 | 3.52 | 1.26 | 2.03 | 2.45 | 1.19 |
| 41 | 24.99 | 17.48 | 15.18 | 2.30 | 1.14 | 1.40 | 1.67 | .47 |
| 42 | 28.79 | 17.09 | 15.58 | 4.51 | 1.49 | 2.61 | 1.45 | .89 |
| 43 | 28.29 | 20.42 | 19.50 | .92 | 1.82 | .93 | 1.62 | .77 |
| 45 | 28.80 | 20.50 | 19.26 | 1.24 | 1.60 | 1.75 | 1.13 | 1.72 |
| 48 | 25.26 | 17.59 | 14.48 | 3.11 | 1.43 | 1.62 | 1.40 | .70 |
| 52 | 27.70 | 17.32 | 15.63 | 1.69 | 2.07 | 1.91 | 1.00 | 2.66 |
| 54 | 51.47 | 33.72 | 27.90 | 5.82 | 2.86 | 6.15 | 2.32 | 1.83 |
| 55 | 19.20 | 13.24 | 12.34 | .90 | 1.07 | 1.11 | .99 | .39 |
| 56 | 29.47 | 21.05 | 18.09 | 2.96 | 2.46 | 1.13 | 1.29 | 1.31 |
| 57 | 51.86 | 38.69 | 33.63 | 5.06 | 2.68 | 3.39 | 2.04 | 2.20 |

Table 87 is derived by finding the average for two years. Thus, for city number five, for the first year, teaching and supervision amounted to 75.9 per cent of the total, for the same city for the second year this item was 74.9 per cent of the total; the average of the two, 75.4 per cent, gives the first figure of Table 87. In like manner, janitors' salaries, for the first and second years respectively, for city number five amount to 6.6 and 6.8 per cent. This gives us our figure, 6.7 per cent, for janitors' salaries for city number five in Table 87 (see Table 87, first line, column three).

Table 88 gives the cost per pupil expressed in dollars and cents. The number used as a divisor here is the figure half-way between the average number of pupils in daily attendance and the average daily enrollment, or average number belonging, as it is sometimes expressed. As stated elsewhere in the text, it is my opinion that this is a better figure than either average daily attendance or average daily enrollment. The only reason that this basis is not used throughout the study is because the figures for average daily enrollment could not be secured for a number of the cities. In the section giving coefficients of correlation will be found a number of coefficients which were worked out on this basis from this table. This table gives data for forty-eight cities for the school year 1902–1903. The first line reads as follows: City number one spent $34.18 per pupil for the maintenance and operation of schools, of which $21.38 per pupil was spent for teaching, $0.99 per pupil for supervision, $0.17 per pupil for clerk, $2.26 per pupil for janitors' salaries, etc.

Table 89 gives the cost per pupil expressed in dollars and cents. The average number of pupils in daily attendance is used as the divisor in this case. The first line reads as follows: City number one spent $35.64 per pupil for the maintenance and operation of schools, of which $22.30 per pupil was spent for teaching, $1.03 per pupil for supervision, etc. This table gives data for fifty-seven cities for the school year 1902-1903.

Table 90 gives the same information as Table 89, calculated on the same basis for thirty of these cities for the school year 1903–1904. This table is read the same as Table 89.

Table 91 gives the average cost per pupil for thirty cities for two years, the school years 1902–1903 and 1903–1904, for the principal items of expense. This table is derived from Tables 89 and 90, which are based on the average number of pupils in daily attendance. The first line reads as follows: In city number five the average for two years of the cost per pupil for maintenance and operation of schools was $33.67 (1902–1903, $33.27; and 1903–1904, $34.08); for teaching and supervision the average was $25.33; for teaching alone, $24.59, etc.

Throughout the tables a number written across the space between the columns indicates that this number applies to the two adjoining columns taken together, and similarly an underscore running across three or more columns indicates that the number applies to these columns collectively.

### *Variability*

In the tables given above, which compare the different items of the school budget on a common basis, the most striking thing to be noticed is the variability which exists among the cities. It is the purpose of this section to consider somewhat minutely the problem of variability in connection with the apportionment of school moneys among the several items of the budget. It may not be out of place here to call attention to the ambiguity if not the positive misrepresentation of facts which results when, as in most cases where such data have been collected, the average alone is given to represent the facts. Of course, if one accepts the average as meaning simply that the sum of all the cases is divided by their number, no harm is done; but if one takes the average as indicative of the general tendency or as a measure applicable to

the majority of the cases, he may be most completely deluded. The average expenditure per pupil for cities Nos. 22, 23, 54, and 57 for the first year (see Table 89) is $31.94. They spent $8.94, $12.85, $54.72, and $51.25 respectively per pupil. The average in this case does not correctly represent the group nor any particular city within the group. The thing that interests us in the measurement of any trait in a group is the range or limits within which all of the cases lie, and the grouping of the cases within these limits.

If we consider the facts found in the tables already given we find that cities differ greatly not only in the amount per pupil which they spend for the maintenance and operation of their schools, but also that even where cities spend about the same amount per child, the distribution of this money among the several items of the budget is very different. Again, when we consider simply the distribution of the money that is spent, regardless of the amount, as is done in the table which gives the per cent which each item is of the total cost of maintenance and operation, we find that there is the greatest variability in practice. One city spends 44% of the cost for maintenance and operation for teaching and supervision, while another spends 82% for the same purposes; the janitor receives from 3% to 14% of the money used to run the schools; supervision costs one city 1% and another city 17% of the whole amount spent; salaries for teaching vary from 27% to 73% of the budget. It would seem impossible that the money is properly distributed in every case when we consider this remarkable variability in practice.

The undistributed expenditure reported under the head "Miscellaneous" needs to be considered in any argument concerning the variability in any item as reported by several cities. It is possible that a very large part of the amount thus reported properly belongs to some one of the items for which a report has been made. It may be that the item teaching, supervision, fuel,

janitors' salaries, repairs, or some other would be greatly increased if the report had properly distributed the money. It was to guard against any such obscurity that the attempt was made in this study to secure a complete distribution of expenditures in the cities from which information was received, and, as has been noted above, this attempt was to a remarkable degree successful. Thirty cities out of fifty-eight for the first year report nothing under this head; sixteen reported less than 2%, ten others less than 5%, and the two remaining reported 5.14% and 6.75%, respectively, as unclassified expenditures. For the second year, of thirty cities reporting, eighteen report nothing under "Miscellaneous"; and of the remaining twelve, eight report 1% or less; three, 2%; and one, 3.76% under this head. It is quite evident, I believe, that the miscellaneous item is so small, even where it occurs, that it may not be used as an explanation of the variability which occurs in all items of expenditure; and I feel that it is safe to say that the accurate distributions of the amounts reported under this head would not alter the conclusions reached in this paper.

It might be argued that the great variability is due to the fact that the cities for which data are given are not comparable, that one has at its command a much larger amount of money in proportion to the number of children to be educated than another, and hence the variability. It is true that rightly or wrongly some of these cities are much better provided with money than others, but that does not seem to be the cause of the great variability in the apportionment of the money which they do have. Take, for example, cities Nos. 3, 6, 19, 21, 44, and 56. From the information given in Tables 89 and from the data concerning attendance, Table 92 may be built up:

TABLE 92

| No. of City | Total Expense | No. of Pupils in Daily Attendance | Cost Per Pupil |
|---|---|---|---|
| 3 | $52,708 | 1,876 | $28.06 |
| 6 | 50,613 | 1,826 | 27.65 |
| 19 | 52,870 | 1,831 | 28.90 |
| 21 | 52,178 | 2,127 | 24.50 |
| 44 | 48,410 | 1,850 | 26.18 |
| 56 | 50,192 | 1,794 | 28.01 |

Per cent spent for each item:

| No. of City | Teaching | Supervision | Janitors | Fuel | Text-books and Supplies | Repairs |
|---|---|---|---|---|---|---|
| 3 | 68.2 | 4. | 7.1 | 4.7 | 6.1 | 3.9 |
| 6 | 72.9 | 4.2 | 5.3 | 6.1 | 6.6 | 4. |
| 19 | 62.9 | 3.4 | 6.8 | 7.2 | 7.5 | 5.7 |
| 21 | 69.1 | 12.6 | 5.9 | 3.8 | 1.5 | 3.8 |
| 44 | 63.8 | 4.6 | 6.1 | 10. | 1.2 | 4.3 |
| 56 | 54.6 | 16.3 | 8.4 | 4.4 | 3.4 | 5.3 |

The variation found cannot be due in these cases to a large undistributed amount, for five of these cities distributed their expenditures in the special reports received from them according to the classification given, without finding it necessary to report anything under the head "Miscellaneous," and the other (No. 56) reports only nine-tenths of 1% under this head.

In these cities the amount of money available and the number of pupils to be provided for do not differ very much. We might expect that if there were any principle which controlled the apportionment of money, or if the money were apportioned in the best way, the proportion of the whole cost of maintenance and operation spent for any of the principal items would be approximately the same in these cities. By glancing at the table, however, we see here the same marked variability which is found when the whole number of cities is considered. Not that there is quite so great a range, which would be very unusual because of the limited number of cases, but that the distribution of money among the several items seems not to be determined by any common principle.

It seems strange that of two cities (No. 6 and No. 56) which spend respectively $50,613 for 1826 pupils and $50,192 for 1794 pupils, one should spend 72.9% of its money for teaching while the other spends 54.6% for the same purpose. Of course, if we combine the items of teaching and supervision, they do not differ so much (77.1% and 70.9%), but if this combination of items is made throughout for the cities of this table, we have a variation in the proportion spent for teaching and supervision of from 66.3% to 8 .7% of the total (see Nos. 19 and 21). For the other items in these cities in which the conditions seem to be so much alike, the table shows the same variability. Janitors' salaries vary from 5.3% to 8.4%; fuel, from 3.8% to 10% (in cities which spend respectively $24.50 and $26.18 per pupil); text-books and supplies, from 1.2% to 7.5%; and repairs from 3.8% to 5.7% of the total.

It is, indeed, strange if 44% of the cost of maintenance and operation can in one city provide for proper teaching and supervision, that in another city, which spends more per pupil, it requires 82% of the total for this item. It would seem that owing to tradition, to poor business management, or to some other more invidious cause, the money spent is not always spent to the best advantage. It seems possible, also, that the superintendent whose attention is called to the wide variation in any one item of his budget, might be led to investigate the matter, in order to determine whether there is any good reason for such deviation from the ordinary or normal condition of affairs.

A more careful study of the variability of the several items of the budget shows that in many cases a large expenditure for one item is accompanied by a small expenditure for another. Again, in other cases large expenditures in one item seem to be accompanied by large expenditures in others and small expenditures in some by small expenditures in others. One has but to examine carefully the tables to have suggested the possibility of

significant relationships. In another section I shall consider this matter more fully and measure a number of these relationships exactly by means of the Pearson Coefficient of Correlation.

There are three ways in which we shall express the variability in order to get as clear an idea as is possible of the lack of uniformity and in order to suggest the problems which arise because of this variability.

From the tables already given it is possible for us to make out frequency tables like those which follow. In these tables the first column gives the amount of money spent, or the per cent of the total which the item is, and the second column gives the number of instances where this is true. They give all the facts concerning variability; not only the range or limits within which all of the cases lie, but also the exact placing of every case.

### *Explanation of Tables*

Table 93 gives information for the cities reporting for the school year 1902–1903.

Table A reads as follows: one city spends 27% for teaching; one, 49%; one, 52%; one, 53%; two, 54%, etc.

Table B reads as follows; two cities spend 1% for supervision; eleven spend, 2%; seven, 3%, etc.

Reading the first lines of Tables C and D we find that four cities spent 3% of the budget for janitors' salaries, and that six cities spent 3% for fuel.

TABLE 93

TABLES OF FREQUENCY

The per cent of the total expenditure for maintenance and operation which is spent for teaching, supervision, janitors' salaries, and fuel. Fifty-eight cities, reporting for the school year 1902–03.

| A Teaching | | B Supervision | | C Janitors' Salaries | | D Fuel | |
|---|---|---|---|---|---|---|---|
| Per Cent | Frequency | Per Cent | Frequency | Per Cent | Frequency | Per Cent | Frequency |
| 27 | 1 | 1 | 2 | 3 | 4 | 3 | 6 |
| 28 | 1 | 2 | 11 | 4 | 6 | 4 | 12 |
| 29 | 0 | 3 | 7 | 5 | 15 | 5 | 10 |
| 30 | 0 | 4 | 6 | 6 | 19 | 6 | 11 |
| 31 | 0 | 5 | 1 | 7 | 7 | 7 | 4 |
| 32 | 0 | 6 | 2 | 8 | 3 | 8 | 3 |
| 33 | 0 | 7 | 5 | 9 | 2 | 9 | 3 |
| 34 | 0 | 8 | 0 | 10 | 0 | 10 | 2 |
| 35 | 0 | 9 | 5 | 11 | 0 | 11 | 0 |
| 36 | 0 | 10 | 3 | 12 | 0 | 12 | 1 |
| 37 | 0 | 11 | 4 | 13 | 0 | 13 | 0 |
| 38 | 0 | 12 | 3 | 14 | 1 | 14 | 0 |
| 39 | 0 | 13 | 2 | | | 15 | 0 |
| 40 | 0 | 14 | 0 | | | 16 | 2 |
| 41 | 0 | 15 | 1 | | | | |
| 42 | 0 | 16 | 4 | | | | |
| 43 | 0 | 17 | 2 | | | | |
| 44 | 0 | | | | | | |
| 45 | 0 | | | | | | |
| 46 | 0 | | | | | | |
| 47 | 0 | | | | | | |
| 48 | 0 | | | | | | |
| 49 | 1 | | | | | | |
| 50 | 0 | | | | | | |
| 51 | 0 | | | | | | |
| 52 | 1 | | | | | | |
| 53 | 1 | | | | | | |
| 54 | 2 | | | | | | |
| 55 | 2 | | | | | | |
| 56 | 3 | | | | | | |
| 57 | 0 | | | | | | |
| 58 | 3 | | | | | | |
| 59 | 2 | | | | | | |
| 60 | 0 | | | | | | |
| 61 | 3 | | | | | | |
| 62 | 6 | | | | | | |
| 63 | 6 | | | | | | |
| 64 | 6 | | | | | | |
| 65 | 3 | | | | | | |
| 66 | 2 | | | | | | |
| 67 | 3 | | | | | | |
| 68 | 2 | | | | | | |
| 69 | 2 | | | | | | |
| 70 | 1 | | | | | | |
| 71 | 2 | | | | | | |
| 72 | 1 | | | | | | |
| 73 | 4 | | | | | | |

TABLE 94

TABLES OF FREQUENCY

The per cent of the total expenditure for maintenance and operation which is spent for teaching, supervision, janitors' salaries, and fuel. Average for two years, thirty cities reporting for the school years 1902–03 and 1903–04.

| Teaching | | Supervision | | Janitors' Salaries | | Fuel | |
|---|---|---|---|---|---|---|---|
| Per Cent | Frequency | Per Cent | Frequency | Per Cent | Frequency | Per Cent | Frequency |
| 54 | 3 | 2 | 4 | 3 | 2 | 3 | 4 |
| 55 | 2 | 3 | 4 | 4 | 1 | 4 | 3 |
| 56 | 1 | 4 | 5 | 5 | 10 | 5 | 8 |
| 57 | 2 | 5 | 0 | 6 | 11 | 6 | 9 |
| 58 | 0 | 6 | 1 | 7 | 4 | 7 | 2 |
| 59 | 2 | 7 | 1 | 8 | 1 | 8 | 2 |
| 60 | 2 | 8 | 2 | 9 | 1 | 9 | 0 |
| 61 | 1 | 9 | 2 | | | 10 | 0 |
| 62 | 3 | 10 | 2 | | | 11 | 1 |
| 63 | 1 | 11 | 3 | | | | |
| 64 | 4 | 12 | 2 | | | | |
| 65 | 2 | 13 | 0 | | | | |
| 66 | 2 | 14 | 0 | | | | |
| 67 | 2 | 15 | 2 | | | | |
| 68 | 1 | 16 | 0 | | | | |
| 69 | 0 | 17 | 2 | | | | |
| 70 | 0 | | | | | | |
| 71 | 0 | | | | | | |
| 72 | 2 | | | | | | |
| 73 | 1 | | | | | | |

It is interesting to compare the distributions given above with similar figures in Table 95 for one hundred and three cities considered in "A Study of the Expenses of City School Systems" by Dr. Harlan Updegraff [1912], recently issued by the United States Bureau of Education.

TABLE 95

DISTRIBUTION OF PERCENTAGES OF TOTAL SCHOOL EXPENSES EXPENDED FOR VARIOUS PURPOSES

A. FOR SUPERINTENDENT'S OFFICE

| Per Cent of Total School Expenses | Number of Cities | Per Cent of Total School Expenses | Number of Cities |
|---|---|---|---|
| Less than 0.50 | 2 | 2.50 to 2.99 | 13 |
| 0.50 to 0.99 | 14 | 3.00 to 3.49 | 9 |
| 1.00 to 1.49 | 15 | 3.50 to 3.99 | 4 |
| 1.50 to 1.99 | 25 | 4.00 to 4.50 | 3 |
| 2.00 to 2.49 | 17 | | |

TABLE 95 (*Continued*)

DISTRIBUTION OF PERCENTAGES OF TOTAL SCHOOL EXPENSES EXPENDED FOR VARIOUS PURPOSES

B. GENERAL CONTROL

| | | | |
|---|---|---|---|
| Less than 1.00 | 1 | 5.00 to 5.99 | 7 |
| 1.00 to 1.99 | 13 | 6.00 to 6.99 | 5 |
| 2.00 to 2.99 | 32 | 7.00 to 7.99 | 1 |
| 3.00 to 3.99 | 24 | 8.00 to 8.99 | 3 |
| 4.00 to 4.99 | 16 | 9.00 to 9.99 | 1 |

C. SALARIES OF ELEMENTARY TEACHERS

| | | | |
|---|---|---|---|
| Below 42.50 | 1 | 55.00 to 57.49 | 9 |
| 42.50 to 44.99 | 2 | 57.50 to 59.99 | 18 |
| 45.00 to 47.49 | 9 | 60.00 to 62.49 | 9 |
| 47.50 to 49.99 | 9 | 62.50 to 64.99 | 5 |
| 50.00 to 52.49 | 16 | 65.00 to 67.49 | 3 |
| 52.50 to 54.99 | 20 | Above 67.50 | 2 |

D. TOTAL EXPENSES OF ELEMENTARY SCHOOLS

| | | | |
|---|---|---|---|
| Below 65.00 | 3 | 75.00 to 77.49 | 24 |
| 65.00 to 67.49 | 0 | 77.50 to 79.99 | 22 |
| 67.50 to 69.99 | 9 | 80.00 to 82.49 | 10 |
| 70.00 to 72.49 | 11 | 82.50 to 84.99 | 4 |
| 72.50 to 74.99 | 16 | 85.00 to 87.49 | 4 |

E. SALARIES OF SECONDARY TEACHERS

| Per Cent of Total School Expenses | Number of Cities | Per Cent of Total School Expenses | Number of Cities |
|---|---|---|---|
| Below 6.00 | 2 | 12.00 to 13.99 | 20 |
| 6.00 to 7.99 | 7 | 14.00 to 15.99 | 17 |
| 8.00 to 9.99 | 18 | 16.00 to 17.99 | 9 |
| 10.00 to 11.99 | 26 | 18.00 | 3 |

F. TOTAL EXPENSES OF SECONDARY SCHOOLS

| | | | |
|---|---|---|---|
| 7.50 to 9.99 | 8 | 17.50 to 19.99 | 21 |
| 10.00 to 12.49 | 14 | 20.00 to 22.49 | 8 |
| 12.50 to 14.99 | 22 | 22.50 to 24.99 | 7 |
| 15.00 to 17.49 | 21 | 25.00 to 27.50 | 2 |

TABLE 95 (*Continued*)

DISTRIBUTION OF PERCENTAGES OF TOTAL SCHOOL EXPENSES EXPENDED FOR VARIOUS PURPOSES

G. SALARIES OF TEACHERS OF ALL SCHOOLS

| | | | |
|---|---|---|---|
| 52.5 to 54.9 | 1 | 67.5 to 69.9 | 22 |
| 55.0 to 57.4 | 4 | 70.0 to 72.4 | 17 |
| 57.5 to 59.9 | 1 | 72.5 to 74.9 | 11 |
| 60.0 to 62.4 | 10 | 75.0 to 77.4 | 2 |
| 62.5 to 64.9 | 14 | 77.5 to 80.0 | 2 |
| 65.0 to 67.4 | 17 | Above 80.0 | 2 |

H. SUPERVISION OF ALL SCHOOLS

| | | | |
|---|---|---|---|
| Less than 1.00 | 15 | 6.00 to 6.99 | 2 |
| 1.00 to 1.99 | 24 | 7.00 to 7.99 | 2 |
| 2.00 to 2.99 | 18 | 8.00 to 8.99 | 2 |
| 3.00 to 3.99 | 5 | 9.00 to 9.99 | 3 |
| 4.00 to 4.99 | 5 | 10.00 and over | 5 |
| 5.00 to 5.99 | 4 | | |

I. TEXT-BOOKS, STATIONERY, AND SCHOOL SUPPLIES OF ALL SCHOOLS

| | | | |
|---|---|---|---|
| Less than 1.00 | 9 | 5.00 to 5.99 | 14 |
| 1.00 to 1.99 | 17 | 6.00 to 6.99 | 8 |
| 2.00 to 2.99 | 17 | 7.00 to 7.99 | 5 |
| 3.00 to 3.99 | 17 | 8.00 to 8.99 | 1 |
| 4.00 to 4.99 | 12 | 9.00 to 9.99 | 1 |

J. FUEL FOR ALL SCHOOLS

| | | | |
|---|---|---|---|
| Less than 1.00 | 5 | 5.00 to 5.99 | 13 |
| 1.00 to 1.99 | 12 | 6.00 to 6.99 | 1 |
| 2.00 to 2.99 | 22 | 7.00 to 7.99 | 3 |
| 3.00 to 3.99 | 26 | 8.00 to 8.99 | 1 |
| 4.00 to 4.99 | 18 | | |

K. INSTRUCTION, OPERATION, AND MAINTENANCE OF ALL SCHOOLS

| | | | |
|---|---|---|---|
| Below 84.00 | 1 | 92.00 to 93.99 | 28 |
| 84.00 to 85.99 | 2 | 94.00 to 95.99 | 46 |
| 86.00 to 87.99 | 1 | 96.00 to 97.99 | 14 |
| 88.00 to 89.99 | 3 | 98.00 to 100.00 | 1 |
| 90.00 to 91.99 | 7 | | |

TABLE 96

TABLES OF FREQUENCY

Cost per pupil expressed in dollars, the average daily attendance being used as the basis of calculation. Fifty-eight cities, reporting for the school year 1902–03.

| Total Cost per Pupil | | Teaching and Supervision | | Janitors' Salaries | | Fuel | | Text-books and Supplies | |
|---|---|---|---|---|---|---|---|---|---|
| Dollars | Frequency | Dollars | Frequency | Dollars | Frequency | Dollars | Frequency | Dollars | Frequency |
| 8 | 1 | 6 | 1 | .4 | 1 | .4 | 1 | .2 | 2 |
| 9 | 0 | 7 | 1 | .5 | 0 | .5 | 0 | .3 | 1 |
| 10 | 0 | 8 | 0 | .6 | 0 | .6 | 0 | .4 | 1 |
| 11 | 0 | 9 | 1 | .7 | 0 | .7 | 1 | .5 | 0 |
| 12 | 1 | 10 | 0 | .8 | 0 | .8 | 1 | .6 | 0 |
| 13 | 0 | 11 | 1 | .9 | 2 | .9 | 1 | .7 | 1 |
| 14 | 0 | 12 | 0 | 1.0 | 3 | 1.0 | 2 | .8 | 0 |
| 15 | 1 | 13 | 1 | 1.1 | 4 | 1.1 | 3 | .9 | 2 |
| 16 | 0 | 14 | 2 | 1.2 | 0 | 1.2 | 5 | 1.0 | 2 |
| 17 | 0 | 15 | 3 | 1.3 | 2 | 1.3 | 4 | 1.1 | 2 |
| 18 | 0 | 16 | 3 | 1.4 | 3 | 1.4 | 3 | 1.2 | 1 |
| 19 | 1 | 17 | 6 | 1.5 | 5 | 1.5 | 2 | 1.3 | 3 |
| 20 | 2 | 18 | 3 | 1.6 | 2 | 1.6 | 3 | 1.4 | 1 |
| 21 | 2 | 19 | 8 | 1.7 | 3 | 1.7 | 3 | 1.5 | 2 |
| 22 | 2 | 20 | 3 | 1 8 | 4 | 1.8 | 3 | 1.6 | 4 |
| 23 | 2 | 21 | 5 | 1.9 | 8 | 1.9 | 1 | 1.7 | 3 |
| 24 | 4 | 22 | 1 | 2.0 | 3 | 2.0 | 5 | 1.8 | 1 |
| 25 | 1 | 23 | 5 | 2.1 | 3 | 2.1 | 0 | 1.9 | 3 |
| 26 | 4 | 24 | 4 | 2.2 | 2 | 2.2 | 3 | 2.0 | 5 |
| 27 | 2 | 25 | 3 | 2.3 | 4 | 2.3 | 2 | 2.1 | 2 |
| 28 | 8 | 26 | 2 | 2.4 | 2 | 2.4 | 0 | 2.2 | 0 |
| 29 | 4 | 27 | 0 | 2.5 | 2 | 2.5 | 0 | 2.3 | 1 |
| 30 | 2 | 28 | 0 | 2.6 | 1 | 2.6 | 2 | 2.4 | 0 |
| 31 | 5 | 29 | 0 | 2.7 | 0 | 2.7 | 1 | 2.5 | 1 |
| 32 | 3 | 30 | 1 | 2.8 | 0 | 2.8 | 0 | 2.6 | 0 |
| 33 | 1 | 31 | 0 | 2.9 | 1 | 2.9 | 1 | 2.7 | 0 |
| 34 | 2 | 32 | 1 | 3.0 | 1 | 3.0 | 0 | 2.8 | 0 |
| 35 | 3 | 33 | 0 | | | 3.1 | 0 | 2.9 | 0 |
| 36 | 1 | 34 | 0 | | | 3.2 | 0 | 3.0 | 1 |
| 37 | 1 | 35 | 0 | | | 3.3 | 1 | 3.1 | 0 |
| 38 | 0 | 36 | 1 | | | 3.4 | 1 | 3.2 | 0 |
| 39 | 0 | 37 | 0 | | | 3.5 | 0 | 3.3 | 0 |
| 40 | 0 | 38 | 1 | | | 3.6 | 1 | 3.4 | 0 |
| 41 | 1 | | | | | 3.7 | 0 | 3.5 | 1 |
| 42 | 0 | | | | | 3.8 | 0 | 3.6 | 0 |
| 43 | 1 | | | | | 3.9 | 0 | 3.7 | 0 |
| 44 | 0 | | | | | 4.0 | 0 | 3.8 | 0 |
| 45 | 0 | | | | | 4.1 | 0 | 3.9 | 0 |
| 46 | 0 | | | | | 4.2 | 0 | 4.0 | 0 |
| 47 | 0 | | | | | 4.3 | 0 | 4.1 | 0 |
| 48 | 0 | | | | | 4.4 | 0 | 4.2 | 0 |
| 49 | 0 | | | | | 4.5 | 0 | 4.3 | 0 |
| 50 | 0 | | | | | 4.6 | 0 | 4.4 | 0 |
| 51 | 1 | | | | | 4.7 | 1 | 4.5 | 0 |
| 52 | 0 | | | | | | | 4.6 | 1 |
| 53 | 0 | | | | | | | | |
| 54 | 1 | | | | | | | | |

TABLE 97

TABLES OF FREQUENCY

Cost per pupil expressed in dollars, average for two years, the average daily attendance being used as the basis of calculation. Thirty cities, reporting for the school years 1902–03 and 1903–04.

| Total Cost per Pupil | | Teaching and Supervision | | Janitors' Salaries | | Fuel | | Text-books and Supplies | |
|---|---|---|---|---|---|---|---|---|---|
| Dollars | Frequency | Dollars | Frequency | Dollars | Frequency | Dollars | Frequency | Dollars | Frequency |
| 19 | 2 | | | | | | | | |
| 20 | 0 | 13 | 1 | 1.0 | 2 | .9 | 2 | .8 | 1 |
| 21 | 0 | 14 | 0 | 1.1 | 2 | 1.0 | 1 | .9 | 1 |
| 22 | 0 | 15 | 1 | 1.2 | 2 | 1.1 | 1 | 1.0 | 2 |
| 23 | 1 | 16 | 0 | 1.3 | 0 | 1.2 | 1 | 1.1 | 2 |
| 24 | 1 | 17 | 6 | 1.4 | 2 | 1.3 | 1 | 1.2 | 0 |
| 25 | 3 | 18 | 4 | 1.5 | 3 | 1.4 | 2 | 1.3 | 0 |
| 26 | 1 | 19 | 1 | 1.6 | 2 | 1.5 | 3 | 1.4 | 1 |
| 27 | 3 | 20 | 5 | 1.7 | 0 | 1.6 | 3 | 1.5 | 0 |
| 28 | 5 | 21 | 2 | 1.8 | 3 | 1.7 | 2 | 1.6 | 6 |
| 29 | 3 | 22 | 3 | 1.9 | 3 | 1.8 | 2 | 1.7 | 3 |
| 30 | 1 | 23 | 1 | 2.0 | 3 | 1.9 | 2 | 1.8 | 0 |
| 31 | 4 | 24 | 0 | 2.1 | 2 | 2.0 | 1 | 1.9 | 3 |
| 32 | 1 | 25 | 3 | 2.2 | 1 | 2.1 | 2 | 2.0 | 1 |
| 33 | 2 | 26 | 1 | 2.3 | 1 | 2.2 | 0 | 2.1 | 0 |
| 34 | 0 | 27 | 0 | 2.4 | 1 | 2.3 | 3 | 2.2 | 0 |
| 35 | 0 | 28 | 0 | 2.5 | 0 | 2.4 | 2 | 2.3 | 0 |
| 36 | 0 | 29 | 0 | 2.6 | 1 | 2.5 | 0 | 2.4 | 0 |
| 37 | 0 | 30 | 0 | 2.7 | 0 | 2.6 | 0 | 2.5 | 0 |
| 38 | 1 | 31 | 0 | 2.8 | 1 | 2.7 | 0 | 2.6 | 1 |
| 39 | 0 | 32 | 0 | 2.9 | 0 | 2.8 | 0 | 2.7 | 0 |
| 40 | 0 | 33 | 1 | 3.0 | 0 | 2.9 | 0 | 2.8 | 0 |
| 41 | 0 | 34 | 0 | 3.1 | 1 | 3.0 | 0 | 2.9 | 0 |
| 42 | 0 | 35 | 0 | | | 3.1 | 0 | 3.0 | 0 |
| 43 | 0 | 36 | 0 | | | 3.2 | 0 | 3.1 | 0 |
| 44 | 0 | 37 | 0 | | | 3.3 | 1 | 3.2 | 0 |
| 45 | 0 | 38 | 1 | | | | | 3.3 | 1 |
| 46 | 0 | | | | | | | 3.4 | 0 |
| 47 | 0 | | | | | | | 3.5 | 0 |
| 48 | 0 | | | | | | | 3.6 | 0 |
| 49 | 0 | | | | | | | 3.7 | 0 |
| 50 | 0 | | | | | | | 3.8 | 0 |
| 51 | 2 | | | | | | | 3.9 | 0 |
| | | | | | | | | 4.0 | 0 |
| | | | | | | | | 4.1 | 0 |
| | | | | | | | | 4.2 | 0 |
| | | | | | | | | 4.3 | 0 |
| | | | | | | | | 4.4 | 0 |
| | | | | | | | | 4.5 | 0 |
| | | | | | | | | 4.6 | 0 |
| | | | | | | | | 4.7 | 0 |
| | | | | | | | | 4.8 | 0 |
| | | | | | | | | 4.9 | 0 |
| | | | | | | | | 5.0 | 0 |

TABLE 97 (*Continued*)

TABLES OF FREQUENCY

Cost per pupil expressed in dollars, average for two years, the average daily attendance being used as the basis of calculation. Thirty cities, reporting for the school years 1902–03 and 1903–04.

| Total Cost per Pupil | | Teaching and Supervision | | Janitors' Salaries | | Fuel | | Text-books and Supplies | |
|---|---|---|---|---|---|---|---|---|---|
| Dollars | Frequency | Dollars | Frequency | Dollars | Frequency | Dollars | Frequency | Dollars | Frequency |
| | | | | | | | | 5.1 | 0 |
| | | | | | | | | 5.2 | 0 |
| | | | | | | | | 5.3 | 0 |
| | | | | | | | | 5.4 | 0 |
| | | | | | | | | 5.5 | 0 |
| | | | | | | | | 5.6 | 0 |
| | | | | | | | | 5.7 | 0 |
| | | | | | | | | 5.8 | 0 |
| | | | | | | | | 5.9 | 0 |
| | | | | | | | | 6.0 | 0 |
| | | | | | | | | 6.1 | 1 |

It is interesting to compare with the distribution given above, the facts of Table 98 taken from Dr. Updegraff's study of city school expenses.

The 103 cities of 30,000 population or over whose expenses presented are divided into four groups. Group I is composed of cities of 300,000 population or over in 1910; Group II, of cities of 100,000 to 300,000; Group III, of cities of 50,000 to 100,000; and Group IV, of cities of 30,000 to 50,000. The number of cities in each of the respective groups is as follows; 13, 20, 42, 28. The total number of cities in the United States in 1910 above 30,000 in population was 184, distributed among the various groups as follows: 18, 32, 59, 75.

## TABLE 98

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF ELEMENTARY SCHOOLS

### A. SALARIES OF TEACHERS

| AVERAGE COSTS | CITIES OF— | | | | |
|---|---|---|---|---|---|
| | Group I | Group II | Group III | Group IV | All Cities |
| $8–$8.99 | ..... | ..... | ..... | 1 | 1 |
| $9–$9.99 | ..... | ..... | ..... | ..... | ..... |
| $10–$10.99 | ..... | 1 | 1 | 2 | 4 |
| $11–$11.99 | ..... | ..... | 1 | ..... | 1 |
| $12–$12.99 | ..... | 1 | 2 | 3 | 6 |
| $13–$13.99 | 1 | ..... | 4 | 2 | 7 |
| $14–$14.99 | 1 | 1 | 5 | 3 | 10 |
| $15–$15.99 | ..... | 1 | 2 | 1 | 4 |
| $16–$16.99 | ..... | 2 | 4 | 1 | 7 |
| $17–$17.99 | ..... | 2 | 1 | 2 | 5 |
| $18–$18.99 | 1 | 3 | 1 | 1 | 6 |
| $19–$19.99 | ..... | 2 | 2 | 1 | 5 |
| $20–$20.99 | 4 | 1 | 1 | ..... | 6 |
| $21–$21.99 | 2 | ..... | 2 | ..... | 4 |
| $22–$22.99 | ..... | ..... | 1 | ..... | 1 |
| $23–$23.99 | ..... | ..... | ..... | ..... | ..... |
| $24–$24.99 | ..... | 1 | ..... | ..... | 1 |
| $25–$25.99 | ..... | ..... | ..... | ..... | ..... |
| $26–$27 | 1 | ..... | ..... | ..... | 1 |

### B. SUPERVISION

| | | | | | |
|---|---|---|---|---|---|
| Below $0.20 | 2 | 3 | 2 | 1 | 8 |
| $0.20–$0.39 | 2 | 3 | 7 | 7 | 19 |
| $0.40–$0.59 | 2 | 1 | 2 | 1 | 6 |
| $0.60–$0.79 | ..... | 1 | 3 | 2 | 6 |
| $0.80–$0.99 | ..... | ..... | ..... | ..... | ..... |
| $1–$1.19 | 1 | ..... | 2 | 1 | 4 |
| $1.20–$1.39 | ..... | ..... | ..... | ..... | ..... |
| $1.40–$1.59 | ..... | 1 | ..... | 1 | 2 |
| $1.60–$1.79 | ..... | ..... | ..... | ..... | ..... |
| $1.80–$1.99 | 1 | ..... | ..... | 1 | 2 |
| $2–$2.19 | ..... | ..... | 1 | ..... | 1 |
| $2.20–$2.39 | ..... | ..... | 1 | ..... | 1 |
| $2.40–$2.59 | ..... | ..... | 1 | ..... | 1 |
| $2.60–$2.79 | ..... | 1 | ..... | ..... | 1 |
| $2.80–$2.99 | ..... | ..... | ..... | ..... | ..... |
| $3–$3.20 | ..... | ..... | 1 | ..... | 1 |

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF ELEMENTARY SCHOOLS

C. TEXT-BOOKS, STATIONERY, AND GENERAL SUPPLIES

| | | | | | |
|---|---|---|---|---|---|
| Below $0.20 | 1 | 2 | 1 | 3 | 7 |
| $0.20–$0.39 | 1 | 1 | 1 | 1 | 4 |
| $0.40–$0.59 | 1 | 3 | 5 | 3 | 12 |
| $0.60–$0.79 | ..... | 4 | 3 | 1 | 8 |
| $0.80–$0.99 | 4 | 2 | 2 | 2 | 10 |
| $1–$1.19 | 1 | ..... | 7 | 2 | 10 |
| $1.20–$1.39 | ..... | 1 | 1 | 2 | 4 |
| $1.40–$1.59 | 1 | ..... | 2 | 2 | 5 |
| $1.60–$1.79 | ..... | 1 | 2 | 1 | 4 |
| $1.80–$1.99 | 1 | 1 | 1 | ..... | 3 |
| $2–$2.20 | ..... | ..... | 1 | ..... | 1 |

D. SALARIES OF JANITORS, ENGINEERS, AND FIREMEN

| | | | | | |
|---|---|---|---|---|---|
| $0.40–$0.59 | ..... | ..... | 1 | ..... | 1 |
| $0.60–$0.79 | ..... | ..... | ..... | ..... | ..... |
| $0.80–$0.99 | ..... | 2 | 2 | 3 | 7 |
| $1–$1.19 | ..... | ..... | 4 | 1 | 5 |
| $1.20–$1.39 | 3 | 2 | 2 | 1 | 8 |
| $1.40–$1.59 | 1 | 2 | 5 | 1 | 9 |
| $1.60–$1.79 | 2 | 2 | 4 | 2 | 10 |
| $1.80–$1.99 | 1 | 1 | 4 | 3 | 9 |
| $2–$2.19 | ..... | 3 | 2 | 6 | 11 |
| $2.20–$2.39 | 1 | 1 | 2 | ..... | 4 |
| $2.40–$2.59 | 1 | ..... | ..... | ..... | 1 |
| $2.60–$2.79 | ..... | ..... | 1 | ..... | 1 |
| $2.80–$2.99 | ..... | ..... | ..... | ..... | ..... |
| $3–$3.19 | ..... | 2 | ..... | ..... | 2 |
| $3.20–$3.40 | 1 | ..... | ..... | ..... | 1 |

E. FUEL

| AVERAGE COSTS | CITIES OF— | | | | |
|---|---|---|---|---|---|
| | Group I | Group II | Group III | Group IV | All Cities |
| Below $0.20 | ..... | ..... | ..... | 1 | 1 |
| $0.20–$0.39 | 2 | 4 | 3 | 1 | 10 |
| $0.40–$0.59 | 1 | 2 | 4 | 3 | 10 |
| $0.60–$0.79 | 4 | 1 | 6 | 2 | 13 |
| $0.80–$0.99 | 2 | 1 | 8 | 3 | 14 |
| $1–$1.19 | ..... | 2 | 3 | 1 | 6 |
| $1.20–$1.39 | 1 | 3 | ..... | 2 | 6 |
| $1.40–$1.59 | ..... | 2 | 1 | 2 | 5 |
| $1.60–$1.80 | ..... | ..... | 2 | 1 | 3 |

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF ELEMENTARY SCHOOLS

F. REPAIRS OF BUILDINGS

| | | | | | |
|---|---|---|---|---|---|
| $0.20–$0.39 | ..... | ..... | 1 | 2 | 3 |
| $0.40–$0.59 | ..... | 2 | 2 | 2 | 6 |
| $0.60–$0.79 | 1 | 1 | 5 | 1 | 8 |
| $0.80–$0.99 | 1 | 1 | 2 | ..... | 4 |
| $1–$1.19 | 1 | 2 | 3 | ..... | 6 |
| $1.20–$1.39 | 1 | 2 | 3 | 2 | 8 |
| $1.40–$1.59 | 2 | ..... | 1 | 3 | 6 |
| $1.60–$1.79 | 1 | ..... | 1 | 3 | 5 |
| $1.80–$1.99 | ..... | 4 | 1 | 1 | 6 |
| $2–$2.19 | ..... | ..... | 1 | 1 | 2 |
| $2.20–$2.39 | ..... | ..... | 1 | ..... | 1 |
| $2.40–$2.59 | 1 | ..... | 1 | ..... | 2 |
| $2.60–$2.79 | ..... | ..... | 1 | ..... | 1 |
| $2.80–$2.99 | ..... | ..... | ..... | ..... | ..... |
| $3–$3.19 | ..... | 3 | 1 | ..... | 4 |
| $3.20–$3.39 | ..... | ..... | ..... | ..... | ..... |
| $3.40–$3.60 | 1 | ..... | ..... | ..... | 1 |

G. TOTAL EXPENSE OF INSTRUCTION, OPERATION, AND MAINTENANCE OF ELEMENTARY SCHOOLS

| | | | | | |
|---|---|---|---|---|---|
| $11–$11.99 | ..... | ..... | ..... | 1 | 1 |
| $12–$12.99 | ..... | ..... | ..... | ..... | ..... |
| $13–$13.99 | ..... | 1 | 1 | ..... | 2 |
| $14–$14.99 | ..... | ..... | ..... | 1 | 1 |
| $15–$15.99 | ..... | 1 | 1 | ..... | 2 |
| $16–$16.99 | ..... | ..... | 1 | 2 | 3 |
| $17–$17.99 | ..... | ..... | ..... | ..... | ..... |
| $18–$18.99 | 1 | 1 | 3 | 3 | 8 |
| $19–$19.99 | ..... | ..... | 2 | 1 | 3 |
| $20–$20.99 | ..... | ..... | 2 | ..... | 2 |
| $21–$21.99 | ..... | 1 | 5 | 1 | 7 |
| $22–$22.99 | 1 | 1 | 4 | 3 | 9 |
| $23–$23.99 | 1 | 3 | ..... | 1 | 5 |
| $24–$24.99 | ..... | 1 | ..... | 1 | 2 |
| $25–$25.99 | 1 | 2 | 2 | 2 | 7 |
| $26–$26.99 | 2 | 1 | 3 | 1 | 7 |
| $27–$27.99 | 1 | ..... | ..... | ..... | 1 |
| $28–$28.99 | 1 | 1 | ..... | ..... | 2 |
| $29–$29.99 | ..... | 1 | 2 | ..... | 3 |
| $30–$30.99 | ..... | ..... | 1 | ..... | 1 |
| $31–$31.99 | 1 | 1 | ..... | ..... | 2 |
| $32–$32.99 | ..... | ..... | ..... | ..... | ..... |
| $33–$34 | 1 | ..... | ..... | ..... | 1 |

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF SECONDARY SCHOOLS

A. SALARIES OF TEACHERS

| AVERAGE COSTS | CITIES OF— | | | | |
|---|---|---|---|---|---|
| | Group I | Group II | Group III | Group IV | All Cities |
| $20–$22.49 | ..... | 1 | 2 | 2 | 5 |
| $22.50–$24.99 | ..... | 2 | 1 | 2 | 5 |
| $25–$27.49 | ..... | ..... | ..... | 1 | 1 |
| $27.50–$29.99 | ..... | ..... | 2 | 5 | 7 |
| $30–$32.49 | 1 | 1 | ..... | 2 | 4 |
| $32.50–$34.99 | ..... | 2 | 6 | 2 | 10 |
| $35–$37.49 | 1 | 3 | 5 | ..... | 9 |
| $37.50–$39.99 | ..... | 1 | 5 | ..... | 6 |
| $40–$42.49 | ..... | 1 | ..... | 1 | 2 |
| $42.50–$44.99 | 1 | 1 | 1 | ..... | 3 |
| $45–$47.49 | ..... | 2 | 3 | ..... | 5 |
| $47.50–$49.99 | 2 | ..... | ..... | ..... | 2 |
| $50–$52.49 | ..... | ..... | ..... | 1 | 1 |
| $52.50–$54.99 | 2 | ..... | ..... | 1 | 3 |
| $55–$57.49 | 1 | ..... | ..... | ..... | 1 |
| $57.50–$59.99 | ..... | ..... | ..... | ..... | ..... |
| $60–$62.49 | ..... | 1 | ..... | ..... | 1 |
| $62.50–$64.99 | 1 | ..... | ..... | ..... | 1 |
| $65–$67.49 | 1 | ..... | 1 | ..... | 2 |
| $67.50–$70.00 | ..... | ..... | 1 | ..... | 1 |

B. TEXT-BOOKS, STATIONERY, AND GENERAL SCHOOL SUPPLIES

| | | | | | |
|---|---|---|---|---|---|
| $0.49 | 1 | 5 | 1 | 3 | 10 |
| $0.50–$0.99 | 1 | ..... | 3 | 2 | 6 |
| $1–$1.49 | 1 | ..... | 2 | ..... | 3 |
| $1.50–$1.99 | ..... | 1 | 2 | 3 | 6 |
| $2–$2.49 | 1 | 2 | 1 | 3 | 7 |
| $2.50–$2.99 | 2 | 2 | 2 | 1 | 7 |
| $3–$3.49 | 1 | 1 | ..... | ..... | 2 |
| $3.50–$3.99 | 1 | 1 | 4 | 2 | 8 |
| $4–$4.49 | ..... | 1 | 3 | ..... | 4 |
| $4.50–$4.99 | ..... | ..... | 1 | ..... | 1 |
| $5–$5.49 | ..... | 1 | 1 | ..... | 2 |
| $5.50–$5.99 | 1 | ..... | 1 | 2 | 4 |
| $6 and over | 1 | ..... | 3 | ..... | 4 |

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF SECONDARY SCHOOLS

C. SALARIES OF JANITORS, ENGINEERS, AND FIREMEN

| | | | | | |
|---|---|---|---|---|---|
| $1–$1.24 | ..... | 1 | 2 | ..... | 3 |
| $1.25–$1.49 | ..... | 1 | ..... | 3 | 4 |
| $1.50–$1.74 | ..... | ..... | 2 | 1 | 3 |
| $1.75–$1.99 | ..... | 2 | 2 | 1 | 5 |
| $2–$2.24 | ..... | ..... | 2 | 3 | 5 |
| $2.25–$2.49 | 1 | 2 | 2 | 1 | 6 |
| $2.50–$2.74 | 2 | 1 | 2 | 1 | 6 |
| $2.75–$2.99 | 2 | 1 | 4 | ..... | 7 |
| $3–$3.24 | ..... | 2 | 2 | 2 | 6 |
| $3.25–$3.49 | ..... | ..... | 1 | ..... | 1 |
| $3.50–$3.74 | ..... | 1 | 1 | ..... | 2 |
| $3.75–$3.99 | 1 | 1 | 1 | ..... | 3 |
| $4–$4.24 | 1 | 1 | 2 | 2 | 6 |
| $4.25–$4.49 | ..... | ..... | 1 | 2 | 3 |
| $4.50–$4.74 | ..... | ..... | ..... | ..... | ..... |
| $4.75–$4.99 | 1 | ..... | ..... | ..... | 1 |
| $5–$5.24 | ..... | ..... | 1 | ..... | 1 |
| $5.25–$5.49 | 1 | 1 | ..... | ..... | 2 |
| $5.50–$5.74 | ..... | 1 | ..... | ..... | 1 |
| $5.75–$5.99 | ..... | ..... | ..... | ..... | ..... |
| $6 and over | 1 | ..... | 2 | 1 | 4 |

D. FUEL

| AVERAGE COSTS | CITIES OF— | | | | |
|---|---|---|---|---|---|
| | Group I | Group II | Group III | Group IV | All cities |
| Below $0.20 | ..... | 1 | ..... | ..... | 1 |
| $0.20–$0.39 | 1 | 1 | 1 | ..... | 3 |
| $0.40–$0.59 | ..... | 1 | 3 | 2 | 6 |
| $0.60–$0.79 | 1 | 1 | 2 | ..... | 4 |
| $0.80–$0.99 | 2 | 1 | 2 | 1 | 6 |
| $1–$1.19 | 1 | 2 | 2 | 2 | 7 |
| $1.20–$1.39 | ..... | 2 | 6 | 1 | 9 |
| $1.40–$1.59 | 2 | 1 | 3 | 2 | 8 |
| $1.60–$1.79 | 2 | ..... | 2 | 2 | 6 |
| $1.80–$1.99 | ..... | 1 | 3 | 1 | 5 |
| $2–$2.19 | ..... | 1 | 1 | 1 | 3 |
| $2.20–$2.39 | 1 | 1 | 1 | 1 | 4 |
| $2.40–$2.59 | ..... | ..... | 1 | 1 | 2 |
| $2.60–$2.79 | ..... | ..... | ..... | ..... | ..... |
| $2.80–$2.99 | ..... | ..... | ..... | ..... | ..... |
| $3 and over | ..... | 1 | ..... | 2 | 3 |

TABLE 98 (*Continued*)

DISTRIBUTION OF AVERAGE COSTS, PER PUPIL ENROLLED, OF VARIOUS EXPENSES INVOLVED IN THE INSTRUCTION, OPERATION, AND MAINTENANCE OF SECONDARY SCHOOLS

E. REPAIRS TO BUILDINGS

| | | | | | |
|---|---|---|---|---|---|
| $0.25–$0.49 | | | 2 | 1 | 3 |
| $0.50–$0.74 | | 1 | 3 | 1 | 5 |
| $0.75–$0.99 | | 1 | 1 | 1 | 3 |
| $1–$1.24 | 1 | 1 | 2 | 3 | 7 |
| $1.25–$1.49 | | 1 | 4 | | 5 |
| $1.50–$1.74 | | 2 | | 2 | 4 |
| $1.75–$1.99 | | 2 | | | 2 |
| $2–$2.24 | 1 | 1 | 3 | 1 | 6 |
| $2.25–$2.49 | 1 | 1 | 1 | 2 | 5 |
| $2.50–$2.74 | 1 | 2 | 1 | 1 | 5 |
| $2.75–$2.99 | 1 | | | | 1 |
| $3–$3.24 | 1 | | | | 1 |
| $3.25–$3.49 | 1 | | | | 1 |
| $3.50–$3.74 | 1 | | 1 | | 2 |
| $3.75–$3.99 | | | | | |
| $4–$4.24 | | | 1 | | 1 |
| $4.25–$4.49 | | | | | |
| $4.50–$4.74 | 1 | | | | 1 |
| $4.75–$4.99 | | 1 | 1 | | 2 |
| $5 and over | | | 3 | 1 | 4 |

F. TOTAL EXPENSE OF INSTRUCTION, OPERATION, AND MAINTENANCE

| | | | | | |
|---|---|---|---|---|---|
| $25–$29.99 | | 2 | 2 | 3 | 7 |
| $30–$34.99 | | 1 | | | 1 |
| $35–$39.99 | | 1 | 1 | 6 | 8 |
| $40–$44.99 | | 2 | 7 | 3 | 12 |
| $45–$49.99 | 2 | 2 | 5 | 2 | 11 |
| $50–$54.99 | | 3 | 4 | | 7 |
| $55–$59.99 | 2 | 1 | 2 | 1 | 6 |
| $60–$64.99 | 2 | 1 | 2 | | 5 |
| $65–$69.99 | 1 | 1 | 1 | 2 | 5 |
| $70–$79.99 | 1 | 1 | | | 2 |
| $80–$89.99 | 2 | | 1 | | 3 |
| $90–$100 | | | 2 | | 2 |

Dr. Updegraff states the following conclusions based on comparisons of the average costs of the same kinds of expenses in the different groups of cities:

1. The larger the city the greater the average cost per pupil enrolled of—

(*a*) Total cost of instruction, operation, and maintenance of elementary schools.

(*b*) Salaries of elementary-school teachers.

(*c*) Janitors of elementary schools.

(*d*) Repairs of elementary schools.

(*e*) Total cost of instruction, operation, and maintenance of secondary schools.

(*f*) Salaries of secondary-school teachers.

(*g*) Janitors of secondary schools.

(*h*) Repairs of secondary schools.

2. There is no apparent tendency in the variation of the average cost of—

(*a*) Text-books, stationery, and general school supplies of elementary schools,

(*b*) Fuel of elementary and secondary schools.

Table 94 gives frequency tables based upon the average of the first and second years' figures from thirty cities. It will be noticed that the range is somewhat less, due largely to the fact that there are fewer cases.

The tables for the first year's figures alone are, of course, less reliable than those which give the average for two years, so far as any one city is concerned. However, the greater variability found in these figures for the first year which does not appear where the average for the two years is taken is due largely to the fact that many of the cities which give the extreme variation have not yet reported for two years. In Table 93 for example, the cities reporting 27%, 28%, 49%, and 52%, respectively, for teaching, are cities Nos. 47, 23, 11, and 52, none of which reported for the second year. The variability for the first year's figures is, simply because there are more cases, more nearly a correct representation of the facts of variability, we believe, than the average of the two years where many of the extreme cases are not found. It is remarkable that so small a proportion as 27%

should be devoted to teaching in one case, when other cities use 73% of their funds for this purpose—that some cities should give 2.7 times as great a proportion for teaching as others.

The variation in the proportion which is spent for supervision is not less remarkable. Here the cities seem to divide themselves into groups—those which spend a comparatively large proportion of their money for supervision, and those in which this item is allowed a smaller share of the money. One feels that supervision which costs 17% of the money available for schools should produce remarkable results in the way of saving time and energy for teachers and pupils, if it is to be justified when compared with other cities in which 2% of the budget seems to secure satisfactory supervision.

The range for janitors' salaries may indicate a real difference in the care of school buildings, or, in rare instances, perhaps some connection between ward politics and the janitor's position. Leaving out the most extreme case, it seems rather remarkable that in some instances one dollar out of every eleven available for the maintenance and operation of the schools should be spent for the care of buildings.

That fuel should be allowed in some cities three times as great a proportion of the money spent as in others would not seem strange if our cities were found in sections of the country with very different climatic conditions; but that four or even five times as much should be necessary under conditions which are not greatly different seems preposterous.

Table 94, which is based on the average for two years, gives the most accurate information we have for the thirty cities which reported two years. The limits within which the cases lie are, as has already been noted, somewhat smaller than in the case of the first year's figures considered alone. This is due largely to the fact that we have a smaller number of cases. The variability is, nevertheless, sufficiently striking with a range of from 54% to

73% for teaching, from 2% to 17% for supervision, from 3% to 9% for janitors' salaries, and from 3% to 11% for fuel.

Table 95 gives the variability for the cost per pupil for some of the principal items of the budget. The cost per pupil as given here is based on the average daily attendance.

In the tables given above, we have an expression of the variability in terms of the amount of money spent. We sometimes think of the cities in the region covered by this study as spending a very large amount for public education. The average inhabitant, if not the school officers themselves, of any of these cities will probably say that their school system is quite as good as any other, or at least as good as the average. As a matter of fact, we find a great variability in the total amount per pupil spent, as well as in the amount spent for various items. No one believes that the city which spends $54.00 per pupil furnishes an education six and three quarters times as good as the city which spends only $8.00 per pupil. On the other hand, it hardly seems possible that the opportunity for education in the eight-dollar city can be equal to that found in the fifty-four-dollar city. Teaching and supervision which cost $6.00 per child are hardly likely to be as good as those which cost three, four, five, or even six times as much. No argument based upon the difference in the cost of living could account for so great a difference in the cost of instruction. Either the teachers receive a very much smaller salary in the cities which pay a relatively small amount per pupil, or they have much larger classes to instruct, or both conditions taken together explain the variability.

One may infer that the number of children determines the number of seatings which must be furnished, if not the number and size of buildings; and yet janitors' salaries may cost from 40 cents to $3.00 per pupil, and fuel from 40 cents to $4.70 per pupil.

If we neglect the cases where a very little is spent for text-books

and supplies—the cases where they are not furnished free to pupils—we still find that some cities spend three or four times as much per pupil as others for these articles. It seems rather remarkable that the real value of books and supplies furnished to pupils should vary so much; and even if this were the case, one might question whether the money is spent to best advantage in those cities which spend the larger amounts. Might not a part of this money have been spent to greater advantage in some other way?

The limits within which all of the cases lie are significant, but are not so true a measure of the variability of the group as are the limits within which the middle 50% of the cases lie. A single exceptional case may double the range within which all of the cases lie, but manifestly this does not double the variability of the group. This figure, which we call 2 Q, is found by counting in from both the upper and lower limits until 25% of the cases have been covered, and then finding the range within which the remaining 50% of the cases lie. For instance, in Table 92, in which there are 58 cases, we count off from the lower limit fifteen cases (25% = 14½), which brings us to the group of three cities which spend 58% of their money for teaching; in like manner, counting from the other extreme, 25% of the cases are found to spend more than 67% of their money for teaching. The limits within which the middle 50% of the cases lie are, then, 58 and 67, and 2 Q equals (67—58 = 9) nine. After we have found the 2 Q, the relation which it bears to the median gives us a still better idea of the variability of the group. If it is desired to compare the variability of the group in several traits, the relation of the 2 Q to the square root of the median is more exact than either of the figures before suggested because this measure will be less affected by errors due to inaccuracy of measurements, or to the small number of measurements made. In Table 99 below, 2 Q, the per cent which 2 Q is of the median, and the per cent which

2 Q is of the square root of the median are given. This table is derived from the frequency tables already given.

TABLE 99

MEASURES OF VARIABILITY FOR CITY SCHOOL EXPENDITURES

| | 2 Q | Per cent. which 2 Q is of the Median | Per cent which 2 Q is of the Square Root of the Median |
|---|---|---|---|
| Per cent of total spent for each item. First year's figures. | | | |
| Teaching | 9 | 14 | 113 |
| Supervision | 8 | 105 | 290 |
| Janitors' Salaries | 1 | 16 | 40 |
| Fuel | 3 | 50 | 123 |
| Per cent of total spent for each item. Average of two years' figures. | | | |
| Teaching | 9 | 14 | 112 |
| Supervision | 8 | 100 | 283 |
| Janitors' Salaries | 4 | 65 | 166 |
| Fuel | 1 | 16 | 42 |
| Cost per pupil. First year's figures. | | | |
| Total cost per pupil | 7 | 25 | 132 |
| Teaching and Supervision | 6 | 33 | 136 |
| Janitors' Salaries | .7 | 37 | 50 |
| Fuel | .8 | 50 | 61 |
| Text-books and Supplies | .9 | 53 | 69 |

By calculating the deviations from the medians it will be seen that certain variations in one item are accompanied by like variations in some other item, or that a plus deviation in one item is accompanied by a negative deviation for the other, or *vice versa*. Take, for example, the items of janitors' salaries and salaries for teaching and supervision. In these items one is struck by the fact that a plus deviation in salaries paid janitors is often accompanied by a negative deviation for teaching and supervision, and *vice versa*. Picking out the cases, we have Table 100.

TABLE 100

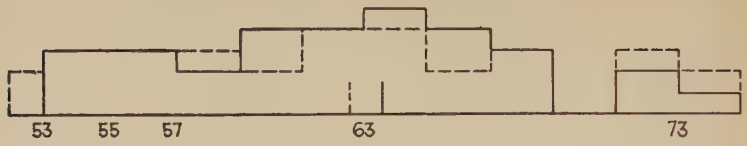
THE RELATION BETWEEN THE AMOUNT SPENT FOR JANITORS' SALARIES AND THE AMOUNT SPENT FOR SALARIES OF TEACHERS AND SUPERVISORS

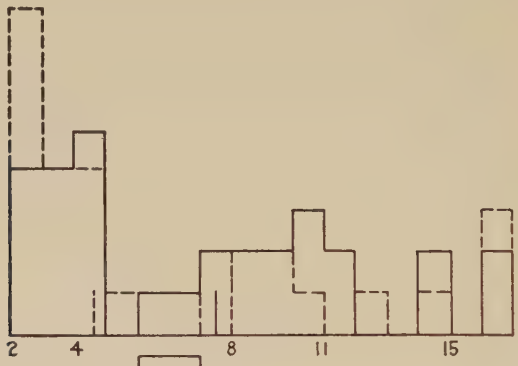
| No. of City | Janitors' Salaries | Salaries for Teaching and Supervision |
|---|---|---|
| 1 | +4. | —5.5 |
| 7 | +3.3 | —3.4 |
| 9 | +1.3 | —1.5 |
| 11 | +3. | —9.9 |
| 14 | + .7 | —3.6 |
| 17 | + .8 | — .5 |
| 19 | + .6 | —5.9 |
| 23 | +8.7 | —13. |
| 27 | +1.1 | —4.5 |
| 28 | +1. | —2. |
| 29 | + .8 | —6.6 |
| 30 | + .1 | — .1 |
| 31 | + .4 | —11.8 |
| 34 | +1.9 | —2.4 |
| 43 | +1.5 | —2.4 |
| 47 | +2.3 | —26.9 |
| 52 | + .8 | —12.2 |
| 56 | +2.2 | — .2 |
| 6 | — .9 | +5.9 |
| 8 | — .1 | + .5 |
| 10 | — .3 | +4.3 |
| 20 | —1. | +2.4 |
| 21 | — .3 | +10.5 |
| 22 | —2. | +3.9 |
| 25 | —1.3 | +6.7 |
| 26 | — .3 | +1.8 |
| 33 | — .1 | +11.1 |
| 36 | —2.7 | +5.2 |
| 37 | — .8 | +4.9 |
| 38 | —2.4 | +2.8 |
| 39 | —1. | +2.2 |
| 46 | —1.6 | +1.4 |
| 49 | —2.2 | +4.8 |
| 51 | — .7 | +8.4 |
| 57 | —1.5 | +3.4 |
| 58 | — .8 | +1.6 |

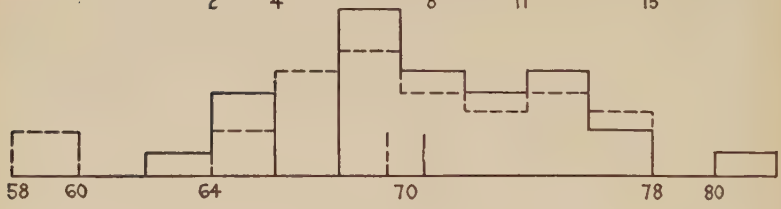
The gross deviations from the median are significant, especially when deviations for different items are compared with each other as indicated above, but the range of variability is better indicated, I believe, by giving the per cent of the median or other single

figure indicating a central tendency. For example, the median for janitors' salaries (first year's figures, per cent basis) is 6.2%, and for salaries for teaching and supervision it is 71.2%. Now, a deviation of .6% in the case of janitors' salaries seems insignificant when compared with a deviation of 7.1% for teaching and supervision—the one is almost twelve times the other; but when we remember that each one represents a deviation equivalent to about 10% of the median, we are nearer recognizing their real significance, I believe, than when we consider them merely in gross. Even this method of comparison is, however, misleading, since it is absolutely impossible for the items "teaching and supervision" or "teaching" to vary as much as 100% above or below the median when the per cent of the total is taken as the basis of comparison, because the median for teaching and supervision amounts to 70.7% and for teaching to 63.1% of the total. On the cost per pupil basis, while it is not impossible to have a variation equal to 100% of the median, or greater, for these larger items, yet, even if such variations occur, they are not comparable to variations which give the same per cent of the median where this item represents a very much smaller part of the total expenditure. Even after these qualifications (which show us that we must be on our guard in comparing variabilities for different items) have been made, I am still of the opinion that such calculations are very helpful in giving us a correct idea of the variability of all items, as well as permitting us to compare the variability of items whose medians represent about the same proportion of the total, or nearly the same cost per pupil.

In Table 101 the items which apparently show the least variability are "total," "teaching and supervision," and "teaching." As noted above, any deviation above the median is possible; *i. e.* the deviation above the median may be 100% or more of the median. It is striking to note that the deviations expressed as per cents of the median for the total amount spent range from



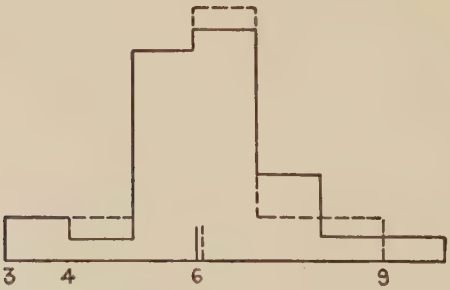
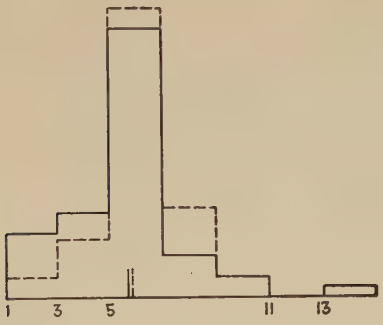
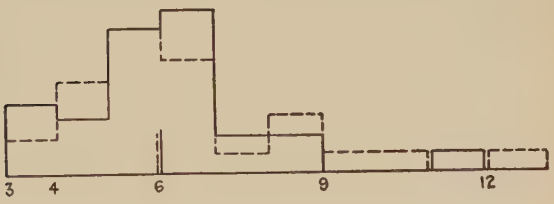




FIG. 24. Teaching
FIG. 25. Supervision
FIG. 26. Teaching and supervision
FIG. 27. Janitors' salaries



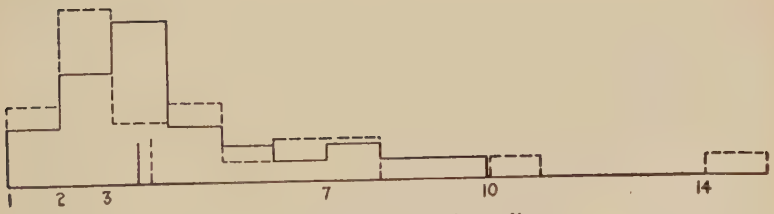
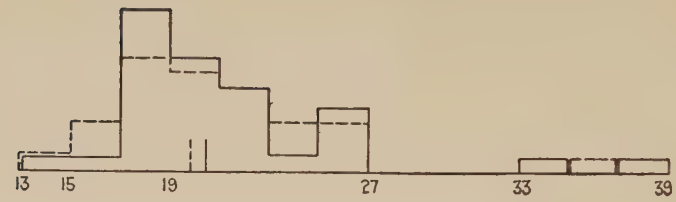
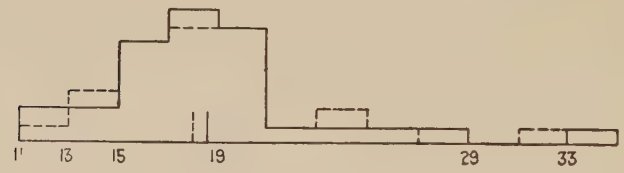
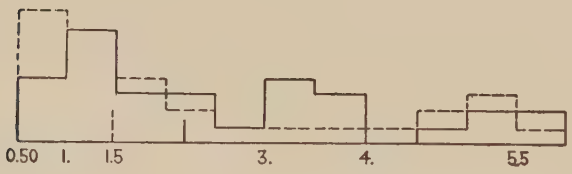
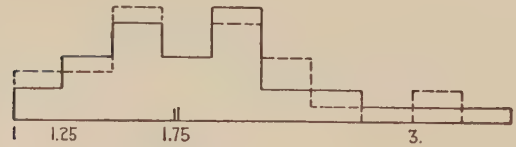




FIG. 28. Text-books and supplies
FIG. 29. Fuel
FIG. 30. Repairs



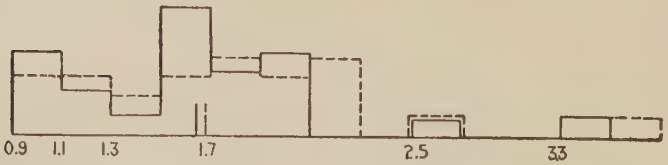
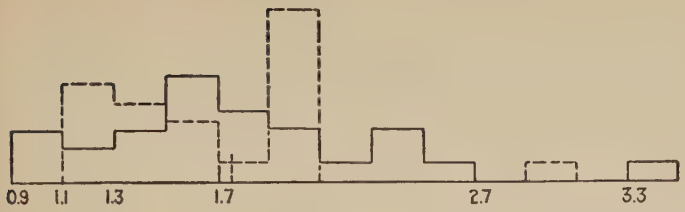




FIG. 31. Teaching and supervision
FIG. 32. Teaching
FIG. 33. Supervision
FIG. 34. Janitors' salaries
FIG. 35. Text-books and supplies



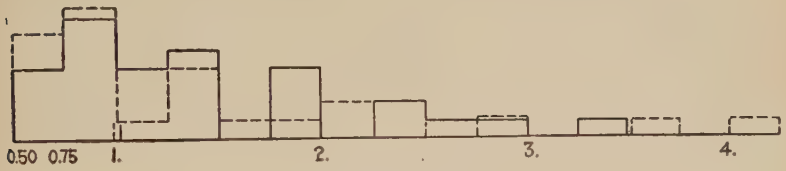




FIG. 36. Fuel
FIG. 37. Repairs

— 30.6% to + 80.2%; while for teaching and supervision the range is from — 35.1% to+88.8%. Apparently the amount paid per child for teaching and supervision is even more variable than the total amount of money spent per child. Possibly this is what we might have expected when we remember that teachers of some sort can be had for almost any salary, while some of the other commodities or utilities which must be had to run the school have a much more definite market value. The great range for supervision from — 73.7% to + 166% is at least partially to be accounted for, I believe, by the fact that no very clear distinction exists between teachers and supervisors or principals in some systems. Those who should have been reported as teachers are, doubtless, in some instances reported as supervisors, and *vice versa*.

The items "janitors' salaries," "text-books and supplies," and "fuel" furnish the best opportunity for comparison of variability. The medians for these items are respectively $1.90, $1.60, and $1.70. The range of deviations for janitors' salaries is from — 42.8% to + 53.5% of the median; for text-books and supplies, from — 42.7% to + 274%; and for fuel, from — 40.9% to + 93.6%.

That the smallest proportional plus variation should be found in the item of janitors' salaries, and the largest for the item of text-books and supplies seems to me to indicate that, in some cities at least, more money means more of those things which make possible efficient work in the schools.

The deviations for the item of repairs show a range of from — 74.8% to + 196.6% of the median. There would probably be less variability in this item if we had the figures for a period of five or ten years, instead of only two years' figures.

Table 102, which gives the deviations from the medians on the per cent basis (the average for two years) reduced to per cent of the median, offers another interesting view of the variability. When we ask how a city spends its money regardless of the amount of money which it has to spend, we are dealing with the problem which every administrator of schools must face. From a median of 70.7% spent for teaching and supervision, we find that the variations range from — 11.7% to + 14.3% of that proportion, while the deviations for teaching alone amount to from — 14.4% to + 16.1%. In these, and in the other items given in this table, we find a smaller range than is found for the same items on the cost per pupil basis. This means, of course, that amount of money per pupil available for maintenance and operation of schools varies much more than does the proportional distribution of that money.

On the basis used in this table, as well as on the cost per pupil basis, we find that the range above the median is less for janitors' salaries than for fuel or text-books and supplies—that of the three, text-books and supplies show the greatest range. The range for janitors' salaries is from—41% to+54.1% of the median; for fuel, from — 40.7% to + 89.8%; for text-books and supplies, from — 94.8% to + 131.6%. In a later section, where the relationship of these items to the total is worked out exactly, the item of text-books and supplies is shown to be more closely corre-

TABLE 101

Deviations from the medians; average cost per pupil for two years reduced to per cents of the medians. The figures refer to per cents and tenths of per cents.

| Number of City | Total | Teaching and Supervision | Teaching | Supervision | Janitors' Salaries | Text-books and Supplies | Fuel | Repairs |
|---|---|---|---|---|---|---|---|---|
| Medians | 28.8 | 20.5 | 18.3 | 2.2 | 1.9 | 1.6 | 1.7 | 1.1 |
| 5 | 20.5 | 23.9 | 34.4 | —64.5 | 21.4 | 0 | 40.9 | —65.5 |
| 6 | —9.7 | —9.3 | —4.9 | —46.1 | —16.1 | 6.1 | —11.7 | 56.1 |
| 8 | 10.4 | 12.2 | 10.9 | 23.1 | 0 | 18.3 | 5.8 | 9.4 |
| 13 | 10.8 | 13.7 | .6 | 124.0 | 5.4 | 6.1 | 23.4 | —28.1 |
| 14 | 0 | —3.9 | — .6 | —36.9 | 10.7 | 0 | 46.8 | 56.1 |
| 15 | —11.5 | —9.3 | —10.4 | 0 | —16.1 | 0 | —5.8 | —37.4 |
| 16 | —1.4 | 4.4 | 4.9 | 0 | 0 | 0 | 0 | —9.4 |
| 20 | —19.8 | —15.6 | —9.3 | —73.7 | —32.1 | —36.6 | 23.4 | —37.4 |
| 27 | —9.4 | —11.7 | —19.1 | 50.7 | 5.4 | 0 | —46.8 | —18.7 |
| 28 | 3.5 | 1.5 | 7.1 | —46.1 | 16.1 | —36.6 | | |
| 29 | —5.9 | —13.2 | —7.1 | —64.5 | 10.7 | 18.3 | —11.7 | 18.7 |
| 30 | 32.0 | 30.2 | 39.9 | —55.3 | 26.7 | | 0 | 196.6 |
| 31 | 2.1 | 7.8 | —1.1 | —64.5 | 5.4 | | 93.6 | 112.2 |
| 32 | 8.3 | —1.0 | —5.5 | 36.9 | 5.4 | —42.7 | 17.6 | 121.6 |
| 34 | 17.0 | 22.9 | 18.6 | —32.3 | 69.5 | | 40.9 | 0 |
| 35 | —5.6 | 1.9 | 8.2 | —50.7 | —16.1 | | —5.8 | 0 |
| 36 | 10.4 | 24.4 | 9.3 | 148.0 | —37.4 | | 5.8 | —65.5 |
| 37 | —30.6 | —25.9 | —35.5 | 59.9 | —42.8 | | —17.6 | —37.4 |
| 39 | 5.6 | 9.8 | 3.3 | 64.5 | —10.7 | | 17.6 | 18.7 |
| 40 | 14.6 | 9.3 | 2.7 | 59.9 | —32.1 | 24.4 | 46.8 | 9.4 |
| 41 | —13.2 | —14.6 | —17.0 | 4.6 | —37.4 | —12.2 | 0 | —56.1 |
| 42 | 0 | —16.6 | —14.8 | 106.0 | —21.4 | 61.0 | —11.7 | —18.7 |
| 43 | —1.7 | 0 | 6.6 | —55.3 | 0 | —42.7 | 0 | —28.1 |
| 45 | 0 | 0 | 5.5 | —41.5 | —16.1 | 6.1 | —29.2 | 56.1 |
| 48 | —12.2 | —14.1 | —20.8 | 41.5 | —21.4 | 0 | —11.7 | —37.4 |
| 52 | —3.8 | —15.2 | —14.8 | 23.1 | 10.7 | 18.3 | —35.1 | 149.0 |
| 54 | 78.8 | 64.9 | 52.5 | 166.0 | 53.5 | 274.3 | 35.1 | —74.8 |
| 55 | —26.4 | —35.1 | —33.3 | —59.9 | —42.8 | —30.5 | —40.9 | —65.5 |
| 56 | 2.4 | 2.9 | 1.1 | 36.9 | 32.1 | —30.5 | —17.6 | 18.7 |
| 57 | 80.2 | 88.8 | 83.6 | 134.0 | 42.8 | 104.0 | 17.6 | 102.8 |

TABLE 102

Deviations from the medians; average for two years of per cent of total which each item is reduced to per cents of the medians. The figures refer to per cents and tenths of per cents.

| Number of City | Teaching and Supervision | Teaching | Supervision | Janitors' Salaries | Text-books and Supplies | Fuel | Repairs |
|---|---|---|---|---|---|---|---|
| Medians | 70.7 | 63.1 | 8.0 | 6.1 | 5.7 | 5.9 | 3.5 |
| 5 | 6.6 | 16.1 | —72.5 | 9.8 | —8.8 | 20.3 | —74.3 |
| 6 | .4 | 5.7 | —45.0 | —1.6 | 15.8 | 1.7 | 85.8 |
| 8 | 2.5 | 1.4 | 5.0 | —1.6 | 5.3 | —3.4 | 2.9 |
| 13 | 3.0 | —5.9 | 92.5 | 3.3 | —7.0 | 11.8 | —28.6 |
| 14 | —3.2 | .5 | —38.8 | 21.4 | —1.8 | 37.3 | 68.6 |
| 15 | 5.7 | 4.3 | 11.2 | 3.3 | 17.6 | 5.1 | —20.1 |
| 16 | 6.8 | 7.6 | —5.0 | 8.2 | —1.8 | 3.4 | 0 |
| 20 | 5.5 | 14.4 | —67.7 | —13.2 | —22.8 | 45.8 | —14.3 |
| 27 | —3.7 | —11.4 | 57.7 | 24.6 | 22.8 | —40.7 | 2.9 |
| 28 | —1.4 | 4.3 | —51.2 | 16.4 | —40.4 | | |
| 29 | —7.1 | —.5 | —62.5 | 26.3 | 21.1 | —5.1 | —40.1 |
| 30 | —.3 | 7.4 | —67.7 | 3.3 | | —22.0 | 137.2 |
| 31 | —9.5 | —3.0 | —66.2 | 8.2 | | 89.8 | 122.7 |
| 32 | —6.5 | —13.9 | 26.2 | 4.9 | —50.9 | 6.8 | 102.8 |
| 34 | —3.0 | 1.7 | 45.0 | 54.1 | | 11.9 | —5.7 |
| 35 | 8.5 | 15.5 | 52.5 | —6.6 | —94.8 | 0 | 8.6 |
| 36 | 14.3 | —.8 | 115.0 | —41.0 | —87.8 | —1.7 | —65.7 |
| 37 | 7.8 | —6.2 | 115.0 | —14.8 | | 17.0 | —2.9 |
| 39 | 4.5 | —1.6 | 48.7 | —11.5 | | 10.2 | 17.2 |
| 40 | —3.7 | —9.7 | 38.8 | —37.7 | 7.0 | 23.7 | 2.9 |
| 41 | —.9 | —3.5 | 13.7 | —26.2 | —1.8 | 13.6 | —48.6 |
| 42 | —1.3 | —14.3 | 90.2 | —14.8 | 59.7 | —13.6 | —11.5 |
| 43 | 1.8 | 8.9 | 58.7 | 4.9 | —42.2 | 0 | —22.9 |
| 45 | .7 | 6.0 | 40.2 | —9.9 | 7.0 | —33.9 | 68.6 |
| 48 | —3.1 | —9.0 | 51.2 | —6.6 | 10.6 | —5.1 | —22.9 |
| 52 | —11.7 | —10.9 | —23.7 | 4.9 | 28.1 | —39.0 | 179.8 |
| 54 | —7.5 | —14.4 | 41.2 | —11.5 | 132.6 | —18.8 | 0 |
| 55 | —2.1 | 2.1 | —40.0 | —8.2 | 1.8 | —13.6 | —42.9 |
| 56 | .7 | —3.5 | 28.7 | 36.1 | —33.3 | —25.4 | 25.7 |
| 57 | 5.4 | 2.7 | 21.2 | —16.4 | | —33.9 | 20.1 |

lated with the total amount spent than are either of the other items.

As a conclusion to the discussion of variability, it may not be out of place to suggest certain limits within which, in my judgment, the cost per pupil or per cent of total amount spent for each item should lie. Allowing for some difference in the cost of living, it seems to me that the superintendent of schools in any city spending less than $30 per pupil for the maintenance and operation of schools, should investigate in order to find out whether the schools are getting their just proportion of the money spent by the city. This amount seems small when compared with the rates of tuition charged to day pupils in our best private schools, where the tuition even in the lower grades is commonly $100 to $200 per year. It is difficult to place the upper limit for the total cost per pupil, except by saying that the expenditure should be increased to such an extent that the public schools shall be able to do as efficient work as our best private schools. When we compare the meager provision which was made for public education fifty years ago with an expenditure of $54 per pupil reported by one of the cities with which this study deals, we are inclined to feel hopeful for the future. If the superintendent of schools, or other school officer, has seen to it that as much money as possible is provided for the public schools, his next problem is to apportion the money secured among the several items of the budget to the best possible advantage. From the data given above, it is my judgment that an ideal budget would give to each of the principal items not less than the first proportion mentioned in the table below, nor more than that indicated by the last figure, except that cities spending an unusually large amount per pupil should, I believe, spend a relatively larger proportion for teaching and supervision, and for text-books and supplies; while the proportion spent for fuel, repairs, and janitors' salaries should increase much more slowly.

| | % of Total | | % of Totals |
|---|---|---|---|
| Teaching and Supervision | from 70% | to | 75% |
| Supervision alone | " 7% | " | 10% |
| Teaching alone | " 60% | " | 68% |
| Janitors' Salaries | " 5% | " | 7% |
| Text-books and Supplies | " 4% | " | 6% |
| Fuel | " 5% | " | 7% |
| Repairs | " 3% | " | 5% |

Teaching and supervision are the most important factors in an effective school system and should, in my opinion, receive a greater rather than a smaller proportion than that usually given. The limits given for supervision are high rather than low, I think. There is a tendency to-day, I believe, to differentiate the work of the supervisor of instruction from that of the class teacher on the one hand, and, on the other, from the mere routine work of the assistant who keeps the office records. This means that a competent supervising principal can do the work of supervision formerly done by five or six men; and that even though he receives a larger salary than was paid any one of the five or six before, the proportion paid for supervision, even when office clerks' salaries are included, has diminished. Janitors' salaries, fuel, and repairs are fixed charges upon the school revenue, which should not much increase in proportion to the amount per pupil available for school purposes.

In a recent bulletin of the United States Bureau of Education the distribution of the money spent ($56,000,000) by one hundred and three cities, each having more than 30,000 population, among the various items of the budget is as shown in Table 103.[1]

The best way to decide just what is the best way to apportion the money among the various items of the budget would be to find out which school system is doing the best work, by testing the pupils in the system, and then to adopt as the ideal apportionment that distribution of moneys which is found in the most efficient school systems.

[1] Harlan Updegraff—*A Study of Expenses of City School Systems.* Bulletin, 1912: No. 5.

TABLE 103

PER CENT OF TOTAL EXPENSES FOR VARIOUS ITEMS OF THE BUDGET FOR ALL CITIES COMBINED

| ITEMS | PER CENT |
|---|---|
| General control | 3.45 |
| Elementary schools | 76.20 |
| Secondary schools | 14.93 |
| Normal, evening, vacation, and special schools | 2.75 |
| Miscellaneous expenses | 2.67 |
| Total | 100.00 |
| Total expenses, general control | 3.45 |
| Salaries of teachers, all schools | 68.92 |
| Salaries and expenses of supervision, all schools | 2.15 |
| Text-books, stationery, and general school supplies, all schools | 3.43 |
| Janitors, engineers, and firemen, all schools | 6.92 |
| Other expenses of operation, all schools | 5.23 |
| Apparatus and equipment, including repairs and replacements thereof, all schools | 1.57 |
| Repairs to buildings | 5.66 |
| Miscellaneous expenses | 2.67 |
| Total | 100.00 |

## *Relationships*

In the discussion of variability given above, it was suggested that a more careful study of the data given would enable us to measure exactly the relationships which exist among the various items of the budget. Such questions of relationship naturally suggest themselves when one considers the distribution of money for different purposes. Do cities which spend a large total amount per pupil spend a correspondingly large amount for teaching? As the amount per pupil increases, is more money spent for every purpose, or are there certain items of expense which do not increase in proportion to the increased cost per pupil? What is the relation between a large amount of money spent for supervision and the amount spent for text-books and supplies, fuel, repairs, etc.? If a larger proportion than usual of the money

available for school purposes is spent for janitors' salaries, what effect may we expect this to have upon teachers' salaries? These and many other similar questions can be answered by determining the relationships which exist among the various items of the budget, on both the cost per pupil and per cent of total bases.

From the tables of deviations of medians given above the fact that relationships exist might, perhaps, be inferred, but no one could from such large tables of details infer the particular relationships which do actually exist. It is just here that the Pearson Coefficient of Correlation is invaluable. The following explanations, adapted from Thorndike's *Educational Psychology* (page 26), will explain the meaning of the coefficient of correlation to the reader not already familiar with its use.

"The coefficient of correlation is a simple figure so calculated from the several records as to give the degree of relationship between any two items which will best account for all the separate cases in the group. In other words, it expresses the degree of relationship from which the actual cases might have arisen with least improbability. It has possible values from + 100 per cent through 0 to — 100 per cent."

A coefficient of correlation of + 100% between two items of the budget (say teachers' salaries and text-books) on the basis of the cost per pupil would indicate that the city which spent the most for teachers' salaries, spent the most for text-books; that the city which spent the least for teachers' salaries, spent the least for text-books; that if the cities were ranged in order according to the amount spent for teachers' salaries, and then in order according to the amount spent for text-books, the two rankings would be identical; that the position of any city with reference to the others for one item will be the same for the other item (both being reduced to terms of the variabilities of the cost per pupil as units to allow comparison).

A coefficient of —100% would, *per contra*, mean that the city

which spent most for one item would spend the smallest amount for the other, that any degree above the average or median in the one would be accompanied by the same degree below the average or median for the other, and *vice versa*. A coefficient of + 62% would mean that (comparison being rendered fair here, as always, by reduction to the variabilities as units) any given station for one item would, on the whole, imply 62 hundredths of that station for the other. A coefficient of —62% would, of course, mean that any position above the average for the one item would, on the whole, involve a position below the average for the other item equal to 62 hundredths of the amount the first was above the average.

Table 104 gives the coefficients which were found on the cost per pupil basis. The first column gives the corrected coefficient [1] as determined from the coefficients found when the first year's figures alone were used, when the second year's figures alone were used, and when the average for the two years was used (see columns 3, 4, and 2). The second column gives the coefficients derived from the average of two years' figures; the third, the coefficients derived from the first year's figures from cities reporting two years; the fourth, the coefficients derived from the second year's figures; and the fifth, the coefficients found when the figures for the fifty-eight cities reporting the first year were used.

In the discussion which follows, the coefficients referred to are always the corrected coefficients, unless it is specifically stated that other coefficients are meant. I believe that the corrected coefficient more nearly expresses the relationship which actually exists among the various items correlated than does any other figure.[2]

[1] This correction is made by using the Spearman formulæ for the correction of the Pearson Coefficient. See *American Journal of Psychology* for January, 1904.

[2] The true relationship between any two items in the budget for these cities is the relationship which would be found if we had perfect measures of the cities' tendencies to spend money for school; such, for instance, as their budgets for forty

TABLE 104

PEARSON COEFFICIENTS OF CORRELATION CALCULATED ON THE COST PER PUPIL BASIS

| | Corrected Coefficient (Spearman formulæ used) | Coefficient derived from the average of the first and second years' figures (30 cities) | Coefficient derived from first year's figures for cities reporting two years (30 cities) | Coefficient derived from second years' figures (30 cities) | Coefficient derived from first year's figures for all cities reporting (58 cities) |
|---|---|---|---|---|---|
| Total Cost per Pupil correlated with Teaching and Supervision | [1]+1.015 | +.97 | +.96 | +.99 | +.88 |
| Total Cost per Pupil correlated with Janitors' Salaries | + .716 | +.66 | +.70 | +.56 | +.73 |
| Total Cost per Pupil correlated with Text-books and Supplies | + .955 | +.85 | +.85 | +.67 | +.64 |
| Total Cost per Pupil correlated with Fuel | [2]+ .522 | +.45 | +.50 | +.34 | +.40 |
| Total Cost per Pupil correlated with Repairs | + .246 | +.24 | +.47 | +.56 | +.35 |
| Teaching and Supervision correlated with Janitors' Salaries | + .746 | +.64 | +.63 | +.44 | +.53 |
| Teaching correlated with Text-books and Supplies | + .737 | +.63 | +.76 | +.35 | +.65 |
| Supervision correlated with Text-books and Supplies | + .869 | +.69 | +.57 | +.51 | +.27 |
| Supervision correlated with Repairs | — .128 | —.14 | +.18 | —.09 | +.07 |
| Supervision correlated with Teaching | + .366 | +.27 | +.31 | +.05 | +.12 |
| Supervision correlated with Fuel | + .11 | +.06 | +.02 | +.04 | +.01 |
| Janitors' Salaries correlated with Fuel | + .531 | +.30 | +.61 | —.08 | +.45 |
| Janitors' Salaries correlated with Repairs | + .219 | +.32 | +.32 | +.30 | +.24 |
| Repairs correlated with Fuel | + .147 | +.12 | +.21 | —.001 | +.20 |

[1] That this coefficient as corrected gives over 100% is due to the fact that the third decimal place is lacking in the coefficients from which the correction was made.

[2] The item "fuel" as reported for the two years is less definite than most of the other items, because fuel bought, or at least fuel paid for, one year is often used the next year; consequently, only the second method given by Spearman for the correction of the Pearson coefficient is used. This method is based on the fact that an increase in the number of measures of each of the facts originally measured increases its accuracy.

The first question which our coefficients enable us to answer concerns the relationship of the total cost per pupil to the principal items of the budget. Does an increased cost per pupil mean

or fifty years. The effect of chance deviations of any single year from the cities' general tendencies is to bring the calculated correlation from its true value toward zero. By the Spearman formulæ we estimate the true relationship (1) from the obtained relationship and the amount of deviation of one year's budget from another year's, or (2) from the difference between the relationship obtained from one year's budget and that from two or more years' budgets. For the theory of the correction see, in general, Thorndike, *Mental and Social Measurements*, pp. 128 and 129, and in detail C. Spearman, on "The Proof and Measurement of Association between Two Things," *American Journal of Psychology*, January, 1904.

a proportionate increase in the amount spent for teaching and supervision, for janitors' salaries, for text-books and supplies, for fuel, and for repairs; or is the relationship between the total cost per pupil and the various items of the budget closer for some than for others? Examining our coefficients we find that the relationship between the total cost per pupil and the cost for teaching and supervision is expressed by a coefficient of + 100%, *i. e.* the amount spent for teaching and supervision is determined by the total amount spent per pupil. If a small total amount per pupil is spent, we may expect a correspondingly small amount per pupil for teaching and supervision; if a large total amount per pupil is spent, we may expect a correspondingly large amount per pupil for teaching and supervision; if the cities were ranked in order on the basis of total amount spent per pupil, and then in order on the basis of the amount spent per pupil for teaching and supervision, we would expect to find that the rank of the cities would be the same for each item. The next closest relationship is that for text-books and supplies, which gives a coefficient of + .955. The others are, in order, janitors' salaries, + .716; fuel, + .522; and repairs, + .246. In general, these relationships show that the amount spent per pupil for teaching and supervision, and for text-books and supplies, corresponds very closely to the total amount spent per pupil; if the cost per pupil is above the average we may expect that the amount spent per pupil will be high for these items, and any diminution in the total amount spent per pupil is likely to be accompanied by a smaller expenditure per pupil for these purposes.

The coefficients found for janitors' salaries and fuel show a less close correspondence. From the relationship here we may infer that the rank of any city above or below the median in total cost per pupil might be compatible with various ranks for janitors' salaries or fuel, which would tend to be approximately three-fourths of the rank in total cost per pupil.

The item of repairs is least closely related with the total cost per pupil. This is as we might have expected. The fact that a school system is expensive does not increase the cost of repairing the buildings, except in so far as the labor necessary to do the work may cost more in those cities which are able to spend the large amount per pupil. We might expect the expensive city to keep its buildings in better repair than the poorer cities, which, with the difference in the cost of labor mentioned above, would seem to account for the coefficient of + .246.

The fact that we find a direct relationship between the total cost per pupil and the cost per pupil for each of the principal items of expenditure makes it clear that, in general, an expensive school system is expensive because it spends more money for everything, and that an inexpensive school system is one that retrenches all along the line. However, the fact that certain of the items are less closely related to the total cost per pupil than others does indicate that these items will probably not be found to increase or decrease in a proportion equal to that of the items

TABLE 105

| | Total Cost per Pupil | Teachers' Salaries | Supervision | Teaching and Supervision | Janitors' Salaries | Text-books and Supplies | Fuel | Repairs |
|---|---|---|---|---|---|---|---|---|
| Average for the five cities nearest the median | $29.00 | $17.80 | $2.20 | $20.00 | $1.90 | $1.80 | $1.90 | $1.60 |
| First group of five cities above the median group | 31.00 | 19.20 | 3.20 | 22.40 | 1.80 | 1.30 | 1.90 | 1.30 |
| Second group of five cities | 34.10 | 21.80 | 2.30 | 24.10 | 2.20 | 1.80 | 2.20 | 1.30 |
| The two cities having the greatest expense per pupil | 51.70 | 30.80 | 5.40 | 36.20 | 2.80 | 4.80 | 2.20 | 2.00 |
| Average for the five cities nearest the median | 29.00 | 17.80 | 2.20 | 20.00 | 1.90 | 1.80 | 1.90 | 1.60 |
| First group of five cities below the median | 27.70 | 18.20 | 1.30 | 19.50 | 1.90 | 1.60 | 1.50 | 1.30 |
| Second group of five cities | 25.50 | 15.70 | 2.40 | 18.10 | 1.50 | 1.60 | 1.40 | .90 |
| The three cities having the smallest expense per pupil | 20.80 | 13.60 | 1.60 | 15.20 | 1.10 | 1.10 | 1.50 | .60 |

showing a closer relationship, nor in proportion to the increase in the total cost per pupil.

Table 105 shows just how an increased or a decreased total cost per pupil affects the principal items of the budget. The figures given refer to dollars, and are calculated from the average amount spent for each item for two years. The data are from thirty cities reporting for the school years 1902–1903 and 1903–1904.

### *Explanation of Table* 105

The first line of the table gives the average total cost per pupil and the average amount spent for each of the principal items of the budget, for the five cities which have a total cost per pupil nearest the median total cost per pupil. The next line gives the same information for the group of five cities having the next highest total cost per pupil. The next two lines are explained in like manner. The fifth line repeats the first line. The sixth line gives the average total cost per pupil and the average expenditure for the several items of expenditure for the five cities which have the next lowest total cost per pupil below the median group. The next two lines are explained in like manner.

From this Table 105 the relationships already shown by the coefficients of correlation given in Table 104 are made clear. In general, the table shows that an increased cost per pupil means an increased expenditure for each item, and that a decreased total cost per pupil is accompanied by a decrease in the amount spent per pupil for everything. An increase of two dollars in the total cost per pupil (see line 2) is accompanied by an increase of $2.40 per pupil in amount spent for teaching and supervision, and a decrease in janitors' salaries, text-books and supplies, and repairs, while fuel remains the same. In the next group, however, with an increase in total cost per pupil above the median group of

$5.10, teaching and supervision show an increase of $4.10, janitors' salaries and fuel show an increase of thirty cents each, text-books and supplies remain the same, and repairs decrease thirty cents per pupil. The next group, with an increased total cost per pupil of $22.70, gives an increase for teaching and supervision of $16.20, an increase for janitors' salaries of ninety cents, an increase for text-books and supplies of $3, an increase for fuel of thirty cents, and an increase for repairs of forty cents per pupil.

By examining the part of the table giving the expenditures for groups of cities spending less than the median group, we find the decrease in all items more constant than was the increase for the cities spending more than was spent by the median group. The very fact that the city spends less than the average probably means that it would be very difficult to keep the expenditure in any one item up to the average without eliminating other necessary expenditures. On the other hand, a city spending more than the average can put the additional money in any place where the demand, of one kind or another, may be strongest.

Let us return again to a consideration of the relationships given in Table 104. The relationship ( + .746) between teaching and supervision and janitors' salaries tends to confirm the observation made above with reference to the relation between these items and the total cost per pupil. We may not expect janitors' salaries to correspond so closely to the total cost per pupil as do teachers' salaries. Apparently there are causes other than those (the cost per pupil of teaching and supervision) which influence the amount per pupil spent for janitors' salaries.

The coefficients for teaching and for supervision with text-books and supplies (+ .737 and + .869, respectively), indicate a closer relationship between the cost per pupil for supervision and for text-books and supplies than exists between the cost per pupil for teaching and for text-books and supplies.

That the relationship between supervision and repairs is

negative (−.128) might seem to imply that high-priced supervision means better care of buildings. The coefficient of supervision correlated with teachers' salaries is +.366. This is rather smaller than one might have expected. It is rather natural to suppose that high-priced supervisors would want high-priced teachers, and that a city spending a large amount per pupil for teachers would spend a correspondingly large amount for supervision. The small coefficient found for supervision correlated with fuel (+.11), seems to indicate that while greater expense for supervisors increases the amount spent for text-books and supplies (see coefficient for supervision with text-books and supplies), it has little in common with the expense for fuel.

The relationship between janitors' salaries and fuel, and janitors' salaries and repairs, is expressed by coefficients of + .531 and + .219, respectively. It will be remembered that fuel is more closely correlated with the total cost per pupil than is janitors' salaries. This being true, it would seem that the correspondence between janitors' salaries and fuel might be accounted for by the fact that they are both determined largely by the total amount spent per pupil. It was found also that supervision and repairs show a negative relationship, and here we find a positive relationship between janitors' salaries and repairs nearly equal to the relationship between repairs and the total cost per pupil. Apparently costly supervision means more for economy in repairs than does a large amount per pupil spent for janitors' salaries.

The next table (No. 106) gives the coefficients which were calculated on the "per cent of total" basis.

These coefficients show what effect the spending of a certain proportion of the money available for one item has on the proportion spent for other items.

TABLE 106

PEARSON COEFFICIENTS OF CORRELATION CALCULATED ON THE PER CENT OF TOTAL BASIS

| | Corrected Coefficient (Spearman formulæ used) | Coefficient derived from the average of first and second years' figures (30 cities) | Coefficient derived from first year's figures for cities reporting two years' figures (30 cities) | Coefficient derived from second year's figures (30 cities) | Coefficient derived from first year's figures for all cities reporting (58 cities) |
|---|---|---|---|---|---|
| Teaching and Supervision correlated with Janitors' Salaries | —.356 | —.30 | —.25 | —.43 | —.48 |
| Teaching correlated with Text-books and Supplies | —.746 | —.46 | —.09 | —.59 | —.12 |
| Janitors' Salaries correlated with Fuel | —.024 | —.03 | +.12 | —.33 | +.26 |
| Janitors' Salaries correlated with Repairs | +.155 | +.17 | +.12 | +.48 | +.13 |
| Supervision correlated with Text-books and Supplies | +.203 | +.17 | +.17 | +.27 | +.01 |
| Supervision correlated with Repairs | —.409 | —.28 | —.06 | —.38 | +.03 |
| Supervision correlated with Teaching | —.983 | —.68 | —.54 | —.69 | —.67 |
| Supervision correlated with Fuel | —.333 | —.20 | —.17 | —.03 | —.02 |
| Repairs correlated with Fuel | +.195 | —.03 | +.003 | +.12 | +.23 |

In this table the significant thing is not so much the size of the positive or negative coefficients as the order, the *relative* closeness of relationship or opposition among the various items. Rearranging the table on this basis and calling the median relationship zero, and transmuting the others on this basis, we have Table 107.

TABLE 107

| | | Transmuted Coefficients |
|---|---|---|
| Supervision correlated with Teaching | —.983 | —.650 |
| Teaching " " Text-books and Supplies | —.746 | —.413 |
| Supervision " " Repairs | —.409 | —.076 |
| Teaching and Supervision correlated with Janitors' Salaries | —.356 | —.023 |
| Supervision correlated with Fuel | —.333 | 0 |
| Janitors' Salaries correlated with Fuel | —.024 | +.309 |
| " " " " Repairs | +.155 | +.488 |
| Repairs correlated with Fuel | +.195 | +.528 |
| Supervision correlated with Text-books and Supplies | +.203 | +.536 |

I believe that the transmuted coefficients more nearly express the true relationship than do those originally found, for we must

have expected a negative relationship between any two items, because a larger proportion than usual spent for one item leaves a smaller proportion of the total to be divided among the other items of the budget. So far as the coefficients obtained enable us to judge, this negative relationship, due simply to the fact that a larger proportion of money than usual spent for any one item leaves a smaller proportion for other items, is approximately the relationship half-way between the extremes—the relationship between supervision and fuel, — .333. If we call this relationship zero, the transmuted relationships give us, as nearly as we can obtain them, the relationships between the other items freed from this constant error.

Let us consider the transmuted coefficients. Suppose a city spends more than the usual proportion for supervision, what other items may we expect to find receiving an unusual proportion of the money spent? The coefficient of + .536 between supervision and text-books and supplies indicates that the probability is that a city which spends a large proportion for one of these items will spend a large proportion for the other—that we may expect to find some cities unusual both in respect to the proportion spent for supervision and that spent for text-books and supplies. The positive coefficients between janitors' salaries, fuel, and repairs, no matter which two are taken together, shows that in cities where one of these items is proportionately large, the others will probably receive more than the usual proportion. Comparing these coefficients with those found for teaching and supervision with janitors' salaries and supervision with fuel, it is suggested that some boards of education are interested particularly in the physical side—the buildings, their care, etc.—and that the over-emphasis on this side means less money for the purely educational activities. The very large negative coefficient for supervision correlated with teachers' salaries would doubtless be reduced if more accurate reports of the amounts

spent for each of these items were available. It is in this relationship between the two items that any mistakes in reporting in either an amount which really belonged to the other would be most apparent. Any amount reported as teaching which should have been given as supervision would make the amount for teaching too large and the amount for supervision too small, and the opposite would be true if an amount which should have been reported as teaching were given as supervision. In either case such mistakes would make this particular coefficient show a more pronounced negative relationship than actually exists. Such mistakes would not, however, have a like effect on other coefficients, where the increase or decrease in the item of supervision or teaching has no effect on the other item correlated. The fact that the amounts given for teaching or supervision may in one case be slightly too large and in another slightly too small, means that, except when the two items themselves are correlated, the mistake in one direction would be offset by the mistake in the other.

The relationship between teachers' salaries and text-books and supplies (— .413) is particularly interesting when contrasted with the relationship between supervision and text-books and supplies (+ .536). If a city spends an undue proportion for supervision we may expect then an unusually large proportion will be spent for text-books and supplies; while the opposite condition holds for the proportion spent for teaching. Possibly the relationship between supervision and text-books and supplies is simply that the highly paid supervisors are able to get appropriations for books and supplies, and that poorly paid supervisors do not have much to do with the actual use or waste of supplies furnished. On the other hand if there is anything that a good teacher wants, it is plenty of books and supplies of the right quality, consequently it seems strange that there should be this opposition in the relative proportions spent for these two items. However, expensive teachers may effect economy by the proper

use of materials, and poorly paid teachers may be the most careless. There is nothing that hurts a book so little as using it properly, and it is conceivable that the best teachers may actually use fewer supplies than those with less ability.

Table 108 gives the correlation of the first and second year's figures on both the cost per pupil and per cent of total bases. These coefficients give us some idea of the relative stability of the various items of the budget. They are used also in making the Spearman correction.

TABLE 108

First and second year's figures correlated. Thirty cities reporting for the school years 1902–03 and 1903–04.

I—Cost per Pupil Basis

| | | | | |
|---|---|---|---|---|
| Total cost per pupil | correlated with | total cost per pupil | | +.92 |
| Supervision and teaching | correlated with | supervision and teaching | | +.89 |
| Supervision | " | " | supervision | +.69 |
| Teachers' salaries | " | " | teachers' salaries | +.79 |
| Janitors' " | " | " | janitors' " | +.90 |
| Text-books and supplies | " | " | text-books and supplies | +.89 |
| Fuel | " | " | fuel | +.17 |
| Repairs " | " | " | repairs | +.34 |

II—Per Cent of Total Basis

| | | | | |
|---|---|---|---|---|
| Supervision and teaching | correlated with | supervision and teaching | | +.56 |
| Supervision | " | " | supervision | +.58 |
| Teachers' salaries | " | " | teachers' salaries | +.51 |
| Janitors' " | " | " | janitors' " | +.80 |
| Text-books and supplies | " | " | text-books and supplies | +.65 |
| Fuel | " | " | fuel | +.34 |
| Repairs | " | " | repairs | +.54 |

The total cost per pupil gives a coefficient of + .92, showing that the amount per child spent does not vary much from year to year—the expensive city remains so, and the city spending little does not suddenly devote a much larger proportion of its revenues for schools. Almost as constant as the total cost per pupil are the amounts spent for janitors' salaries, text-books and supplies, teaching and supervision, giving, as they do, coefficients

of + .90, + .89, + .89, respectively. The items of teaching and supervision, when taken alone, show greater variation (coefficients of +.79 and + .69, respectively), due largely to the fact that, in reporting, amounts properly belonging to one item were reported under the other, rather than in a change of policy as to the relative amount to be allowed for teaching and for supervision.

As one might expect, the amount spent for repairs varies more than any of the items mentioned above (a coefficient of + .34 was found). A large amount spent for repairs one year means a smaller amount the next year, rather than an equally large amount. That the coefficient for fuel is as low as + .17, might seem to indicate that fuel in excess of that which is used is often bought and paid for out of a single year's budget, rather than that there is any very great difference in the value of the fuel actually consumed each year.

When we come to consider the proportion of the total which is spent for any one item for two successive years, we find the variability rather greater than for the amount spent per pupil. This is due to the fact that, while the amount per pupil spent for any one purpose remains fairly constant, any additional expenditure for some new item which increases the gross amount spent, or any diminution in any item of expenditure, affects the proportion which this item is of the total amount spent. It is interesting to note that in the relative constancy with which a given proportion is spent for any item, janitors' salaries lead, followed by text-books and supplies, supervision, teaching and supervision, repairs, teaching, and fuel.

Table 109 gives the coefficients for the total cost per pupil correlated with the per cent which each item is of the total. These coefficients tell us what effect a larger or smaller expenditure per pupil may be expected to have on the proportion which is spent for any one item of the budget.

TABLE 109

PEARSON COEFFICIENTS OF CORRELATION

The total cost per pupil correlated with the per cent which each item is of the total. The average cost per pupil and per cent of total for two years is used as the basis of calculation.

Total cost per pupil correlated with per cent of total spent for:

| | |
|---|---|
| Teaching and Supervision | —.05 |
| Janitors' Salaries | —.06 |
| Text-books and Supplies | +.35 |
| Fuel | —.22 |
| Repairs | +.13 |

Apparently the total cost per pupil may not be expected to affect the proportion spent for teaching and supervision and for janitors' salaries. Cities spending a large amount per pupil do not necessarily spend any greater proportion of their money for these purposes than do cities spending a smaller amount per child. (The coefficients of — .05 and — .06 are so small as to be practically negligible.) On the other hand, the positive coefficients of + .35 for text-books and supplies indicates that there is a direct relationship between the total amount spent per pupil and the proportion which is spent for this purpose. We may expect an expensive city to spend a larger proportion of its money for text-books and supplies than does the poorer city, even though we may infer from this coefficient that the increase in the proportion spent for this purpose will not be proportionate to the increased cost per pupil. The negative coefficient for fuel shows that the proportion spent for fuel decreases as the total cost per pupil increases. The most expensive city will probably spend a smaller proportion of its money for fuel than a poor city. That the proportion spent for repairs should give a positive coefficient of + .13 when correlated with the total cost per pupil seems to indicate that there is some tendency for the more expensive cities to spend a larger proportion for repairs than the less expensive city—possibly the cities spending the greater amount per pupil do keep their buildings in better repair.

Table 110 gives the average salary received by elementary and by high school teachers, and the average daily wage received by carpenters, bricklayers, and day laborers. This information was calculated from two years' data for the thirty cities reporting for the school years 1902–1903 and 1903–1904. The figure given for elementary and high school teachers' salaries was derived by finding first the average salary paid to each class of teachers for each year separately by dividing the gross amount spent for each item by the number of teachers (see form sent to superintendents), and then the average for the two years was taken. In a similar manner, from the report given by city superintendents on the blank filled out by them, the average wage of carpenters, bricklayers, and day laborers was calculated. The information concerning the daily wage of carpenters, bricklayers, and day laborers is probably less exact than we might wish, but sufficiently accurate, I think, to show whether or not any relationship exists between the amounts paid to this class of laborers and to teachers. It is for the purpose last mentioned that these data are given. Coefficients will be given to show what relationship exists between the wages paid carpenters, bricklayers, and day laborers and the salaries paid teachers.

Before we give the coefficients showing the relationship between teachers' salaries and the wages paid carpenters, bricklayers, and day laborers, it is interesting to note the variability in teachers' salaries, as shown by the table given above. The average salary of the elementary school teachers varies from $350.60 in city No. 27 to $691.30—almost twice as much—in city No. 8. The average salary paid high school teachers varies from $558 in city No. 48 to $1332.80—almost two and a half times as much—in city No. 30. Whatever we may believe about the difference in the cost of living, no one would be willing to maintain that the cost of living in one of the cities is double that in another of those covered by this study. In no case does the

TABLE 110

| No. of City | Average High School Teachers' Salary | Average Elementary School Teachers' Salary | Average Daily Wage of Carpenters | Average Daily Wage of Bricklayers | Average Daily Wage of Day Laborers |
|---|---|---|---|---|---|
| 5 | $ 955.5 | $643.1 | | | |
| 6 | 747.1 | 407.5 | $2.50 | $3.25 | $1.75 |
| 8 | 836.4 | 691.6 | 2.50 | 4.00 | 2.00 |
| 13 | 930. | 540.8 | 2.62 | 3.75 | 1.75 |
| 14 | 820.8 | 425.9 | 3.00 | 4.50 | 2.00 |
| 15 | 747.9 | 528.2 | 3.00 | 4.00 | 1.87 |
| 16 | 770.5 | 386.4 | 3.12 | 4.68 | 1.50 |
| 20 | 736.8 | 537.2 | 2.75 | 4.00 | 2.50 |
| 27 | 563.3 | 350.6 | | | |
| 28 | 931.2 | 460.4 | 2.75 | 3.50 | 1.50 |
| 29 | 760.9 | 452.5 | 2.50 | 3.25 | 1.75 |
| 30 | 1,332.8 | 574. | 3.50 | 4.65 | 2.25 |
| 31 | 877.6 | 373.6 | 2.50 | 3.50 | 1.62 |
| 32 | 801.8 | 538.1 | 3.25 | 4.25 | 2.00 |
| 34 | 819.7 | 513.2 | 2.50 | 3.00 | 1.50 |
| 35 | 702.8 | 482.5 | 3.00 | 4.00 | 1.50 |
| 36 | 603.3 | 487.5 | 3.87 | 3.50 | 1.50 |
| 37 | 657.1 | 381.7 | 2.90 | 4.00 | 1.85 |
| 39 | 724.9 | 418.1 | 2.50 | 3.25 | 1.50 |
| 40 | 732.9 | 366.2 | 2.50 | 2.50 | 1.50 |
| 41 | 663.2 | 429.1 | 2.75 | 4.50 | 1.75 |
| 42 | 776.5 | 486.1 | 2.62 | 3.30 | 1.50 |
| 43 | 805.4 | 499. | 2.60 | 3.55 | 1.75 |
| 45 | 835.8 | 504.1 | 2.62 | 4.00 | 1.93 |
| 48 | 558. | 415.2 | 3.00 | 3.75 | 1.50 |
| 52 | 876.7 | 594.5 | 2.85 | 4.00 | 1.50 |
| 54 | 884.2 | 557.5 | 3.37 | 4.25 | 1.75 |
| 55 | 645.8 | 399.6 | 2.75 | 3.50 | 1.50 |
| 56 | 887.5 | 557. | 3.50 | 3.67 | 2.45 |
| 57 | 1,124.1 | 662.7 | 3.50 | 4.70 | 2.25 |

highest daily wage paid a carpenter, bricklayer, or day laborer, as reported, equal double that paid to the poorest paid laborer in any one of these occupations.

The coefficients given above show an increased direct relationship between teachers' salaries and the daily wages paid artisans and day laborers as we go from carpenters, to bricklayers, to

TABLE 111

PEARSON COEFFICIENTS OF CORRELATION

Salaries of teachers correlated with the daily wages of carpenters, bricklayers, and day laborers. The average salary of teachers and the average daily wage for two years are used as the basis of calculation.

| | |
|---|---|
| Elementary Teachers' Salaries correlated with: | |
| Carpenters' Wages | +.28 |
| Bricklayers' Wages | +.44 |
| Day Laborers' Wages | +.57 |
| High School Teachers' Salaries correlated with: | |
| Carpenters' Wages | +.25 |
| Bricklayers' Wages | +.41 |
| Day Laborers' Wages | +.57 |
| High School Teachers' Salaries correlated with Elementary Teachers' Salaries | +.63 |

day laborers. If the wages paid to day laborers are an index of the cost of living, we may infer that cost of living does enter as a determining factor in the amount paid to teachers; not that the amount of salary paid to the teacher corresponds exactly to the cost of living, but that the tendency will be for cities where living is high to pay rather more than the average salary, and for cities where the cost of living is below the average, to pay its teachers less than the average.

TABLE 112

Coefficients of correlation calculated on the cost per pupil basis, the figure used in finding the cost per pupil being half-way between the average number of pupils in daily attendance and the average daily enrollment. Forty-nine cities, reporting for the year 1902–1903.

| | | | |
|---|---|---|---|
| Total cost per pupil | correlated with | Teaching and Supervision | +.93 |
| " " " " | " " | Janitors' Salaries | +.82 |
| " " " " | " " | Text-books and Supplies | +.71 |
| Teaching and Supervision | " " | Janitors' Salaries | +.65 |
| Teaching | " " | Text-books and Supplies | +.66 |
| Supervision | " " | " " " | +.34 |
| " | " " | Repairs | +.15 |
| " | " " | Teaching | +.15 |
| Janitors' Salaries | " " | Fuel | +.40 |
| " " | " " | Repairs | +.45 |

If these coefficients are compared with those given for the first year's figures, they will be found to agree in the main with them. Whatever variation is found is due largely to the fact that on the basis on which this table is computed, nine cities had to be omitted because they did not furnish the necessary data for the average daily enrollment.

Table 113 which follows, shows the relation between the proportion of pupils attending elementary and high schools, and the proportion of the total amount spent for salaries which is used for the salaries of the two classes of teachers. The table also gives the number of students enrolled per teacher, which offers another basis for comparison as between elementary and high school teachers. The number of pupils as given in this table is in every case the average as found from two years' total enrollment figures. In determining the number of teachers, and in determining the amount of money spent for each group, kindergarten teachers and teachers of special subjects, such as nature study, manual training, etc., are counted as elementary school teachers.

### *Explanation of Table 113*

The first column gives the average total number of pupils enrolled in all day schools; the second, the number enrolled in elementary schools, including kindergartens; the third, the number enrolled in high schools. The fourth, fifth, and sixth columns give total amount spent for all day school teachers' salaries, the amount spent for elementary school teachers' salaries, including the salaries of kindergarten and special teachers, and the amount spent for high school teachers' salaries, respectively. The seventh and eighth columns give the per cent of the total number of pupils enrolled who are enrolled in the elementary school, and the per cent of the total amount spent for teachers' salaries which

is spent for the salaries of elementary school teachers. The ninth and tenth columns give the same information for high schools. The eleventh and twelfth columns give the number of pupils enrolled per teacher in both elementary and high schools.

The proportion of the total expenditures, or of the amount spent for salaries, which is spent for the teachers of one class or the other has little significance, except as we are able to compare it with the proportion of the total number of pupils which are enrolled in each class of school. That a city spends 18% of the total amount spent for maintenance and operation for high school teachers' salaries, means one thing when the city enrolls 17% of its total number of pupils in high schools, and quite another thing when the city enrolls 8.5% of the total number in high schools.

The number of pupils enrolled in the elementary schools varies from 71% to 96% of the total number of pupils enrolled, while the money spent for the salaries of elementary school teachers varies from 56% to 91% of the total amount spent for salaries of day school teachers. The median for elementary teachers' salaries is 78.8% of the total amount spent for salaries, while the median for the enrollment in elementary schools is 90.1% of the total enrollment in day schools.

For high schools the variability for the proportion of total enrollment has a range of from 4% to 29%, while the high school teachers receive from 9% to 44% of the money devoted to teachers' salaries. The median for high school teachers is 21.2% of the total amount spent for salaries, while the median for the enrollment in high schools is 9.9% of the total enrollment in day schools. In seventeen out of twenty-nine cases, the proportion of the total amount spent for salaries which is spent for high school teachers' salaries is two, three or even four times the proportion which the high school enrollment is of the total enroll-

ment. Of the remaining twelve cases, seven show a proportionate expenditure for high school teachers' salaries almost double the high school's proportion of the total number of pupils.

The number of pupils enrolled per teacher in the elementary schools varies from 35 to 54, while in the high schools the number varies from 17 to 43. The median number of pupils per teacher is 44 for the elementary schools, and 27 for the high schools. In general, the enrollment per teacher for the elementary schools is about one and one-half times the enrollment per teacher in the high schools.

If we may take the amount spent for salaries as an index of the relative cost of high and elementary school education, we must conclude from the data given above that secondary education costs two, three, or even four times as much per pupil as elementary education. What we would like to have is the expenditures for high schools separate from those for elementary schools in order to be entirely certain of the relative cost of elementary and secondary education. I believe, however, that the item of salaries is a good index, first, because the item of salaries forms from 60% to 80% of the entire budget; and, second, because other expenditures for books, supplies, and apparatus are enough larger, in proportion to the number of pupils enrolled, in the high school to offset an expenditure of the same amount per pupil for janitors' salaries, fuel, repairs, etc.

TABLE 113

| Number of City | Total Number of Pupils Enrolled; Average for Two Years | Number of Elementary School Pupils; Average for Two Years | Number of High School Pupils; Average for Two Years | Total Amount Spent for Teachers' Salaries; Average for Two Years | Amount Spent for Elementary School Teachers' Salaries; Average for Two Years | Amount Spent for High School Teachers' Salaries; Average for Two Years |
|---|---|---|---|---|---|---|
| 5 | 4,286 | 3,796 | 490 | 86,850 | 65,350 | 21,500 |
| 6 | 2,200 | 1,911 | 289 | 31,128 | 22,396 | 8,732 |
| 8 | 2,436 | 2,139 | 297 | 39,570 | 30,845 | 8,725 |
| 13 | 4,049 | 3,765 | 284 | 60,395 | 51,545 | 8,850 |
| 14 | 1,738 | 1,598 | 140 | 25,932 | 28,957 | 4,975 |
| 15 | 5,587 | 5,038 | 549 | 75,531 | 62,137 | 13,394 |
| 16 | 1,220 | 1,136 | 84 | 17,285 | 13,432 | 3,853 |
| 20 | 2,969 | 2,662 | 307 | 42,436 | 33,184 | 9,252 |
| 27 | 2,167 | 1,831 | 336 | 22,595 | 16,413 | 6,182 |
| 28 | 2,231 | 2,143 | 88 | 28,583 | 23,927 | 4,656 |
| 30 | 3,747 | 3,428 | 319 | 76,185 | 59,628 | 16,557 |
| 31 | 3,651 | 3,433 | 218 | 43,992 | 36,193 | 7,799 |
| 32 | 2,999 | 2,728 | 271 | 41,268 | 35,268 | 6,000 |
| 34 | 1,867 | 1,684 | 183 | 30,843 | 24,285 | 6,558 |
| 35 | 5,162 | 4,407 | 755 | 82,351 | 66,891 | 15,460 |
| 36 | 1,633 | 1,350 | 283 | 24,439 | 18,102 | 6,337 |
| 37 | 3,255 | 2,886 | 369 | 30,491 | 23,262 | 7,229 |
| 39 | 1,981 | 1,641 | 340 | 30,652 | 22,362 | 8,290 |
| 40 | 2,138 | 1,510 | 628 | 30,963 | 17,402 | 13,561 |
| 41 | 4,533 | 4,022 | 511 | 54,086 | 42,803 | 11,283 |
| 42 | 4,214 | 3,798 | 416 | 48,937 | 37,687 | 11,250 |
| 43 | 3,094 | 2,636 | 458 | 46,301 | 36,244 | 10,057 |
| 45 | 4,142 | 3,867 | 275 | 60,237 | 48,537 | 11,700 |
| 48 | 1,161 | 1,098 | 63 | 12,099 | 10,424 | 1,675 |
| 52 | 4,978 | 4,680 | 298 | 58,192 | 50,555 | 7,637 |
| 54 | 1,949 | 1,803 | 146 | 38,300 | 31,650 | 6,650 |
| 55 | 2,440 | 2,201 | 239 | 21,762 | 18,200 | 3,562 |
| 56 | 2,126 | 2,029 | 97 | 39,725 | 36,175 | 3,550 |
| 57 | 3,072 | 2,692 | 380 | 74,495 | 55,645 | 18,850 |

TABLE 113 (*Continued*)

| Number of City | Per Cent of the Total Number of Pupils who are Enrolled in Elementary Schools; Average for Two Years | Per Cent of the Total Amount Spent for Salaries; that is, Spent for Elementary Teachers' Salaries; Average for Two Years | Per Cent of the Total Number of Pupils who are Enrolled in High Schools; Average for Two Years | Per Cent of the Total Amount Spent for Salaries; that is, Spent for High School Teachers' Salaries; Average for Two Years | Number of Pupils per Teacher for Elementary Schools | Number of Pupils per Teacher for High Schools |
|---|---|---|---|---|---|---|
| 5 | 88.5 | 75.2 | 11.5 | 24.8 | 43 | 22 |
| 6 | 86.9 | 72.0 | 13.1 | 28.0 | 50 | 25 |
| 8 | 87.7 | 77.9 | 12.3 | 22.1 | 47 | 27 |
| 13 | 93. | 85 3 | 7. | 14.7 | 38 | 30 |
| 14 | 91.8 | 80.9 | 8.2 | 19.1 | 35 | 23 |
| 15 | 90.1 | 82.3 | 9.9 | 17.7 | 48 | 31 |
| 16 | 93.1 | 77.6 | 6.9 | 22.3 | 35 | 17 |
| 20 | 89.6 | 78.3 | 10.4 | 21.7 | 49 | 28 |
| 27 | 84.4 | 72.6 | 15.6 | 27.4 | 47 | 31 |
| 28 | 96.1 | 83.7 | 3.9 | 16.3 | 44 | 18 |
| 30 | 91.4 | 78.2 | 8.6 | 21.8 | 38 | 26 |
| 31 | 94.1 | 82.2 | 5.9 | 17.8 | 38 | 24 |
| 32 | 90.9 | 85.4 | 9.1 | 14.6 | 47 | 36 |
| 34 | 90.1 | 78.8 | 9.9 | 21.2 | 39 | 23 |
| 35 | 85.4 | 81.2 | 14.6 | 18.8 | 38 | 34 |
| 36 | 82.8 | 74.2 | 17.2 | 25.8 | 42 | 27 |
| 37 | 88.5 | 76.3 | 11.5 | 23.7 | 54 | 34 |
| 39 | 82.9 | 72.8 | 17.1 | 27.2 | 37 | 30 |
| 40 | 70.6 | 56.2 | 29.4 | 43.8 | 49 | 34 |
| 41 | 88.8 | 79.1 | 11.2 | 20.9 | 47 | 30 |
| 42 | 90.2 | 77.0 | 9.8 | 23.0 | 56 | 29 |
| 43 | 85.3 | 78.3 | 14.7 | 21.7 | 40 | 36 |
| 45 | 93.4 | 80.6 | 6.6 | 19.4 | 43 | 19 |
| 48 | 94.7 | 86.1 | 5.3 | 13.9 | 48 | 21 |
| 52 | 94.0 | 86.9 | 6. | 13.1 | 50 | 35 |
| 54 | 92.5 | 82.6 | 7.5 | 17.4 | 35 | 20 |
| 55 | 90.2 | 83.6 | 9.8 | 16.4 | 54 | 43 |
| 56 | 95.4 | 91.1 | 4.6 | 8.9 | 46 | 24 |
| 57 | 87.7 | 74.7 | 12.3 | 25.3 | 38 | 22 |

## CONCLUSION

This section will give a brief general summary of the results which have already been obtained, and some practical suggestions which grow out of these facts. First, with regard to variability, it will be remembered that the cost per pupil for the maintenance and operation of schools in the cities considered varies from $9 to $55. That this variation in the total cost per pupil is not due entirely to the relative wealth or poverty of the different communities is shown conclusively when we know that the cost of schools in cities in the United States varies from 6% to 46% of the total city expenditure. An equally striking variability is found in the cost per pupil for each of the principal items of expense. Even when cities spending about the same amount per pupil are considered, it is found that the distribution of the money among the several items seems not to show anything like the degree of uniformity which might be expected. It is found that the percentage of the total cost of maintenance and operation which is spent for teaching and supervision varies from 44% to 82%; and what possibly seems more astonishing is the fact that the city spending the smallest proportion for teaching and supervision, spends the smallest total amount per pupil. Janitors' salaries amount to from 3% to 9% of the budget; one city spends 3% of its money for fuel and another spends 12% for the same purpose; text-books and supplies cost from 1% to 13% of the total cost of maintenance and operation.

Fuel costs three times as much per pupil in one city as in another. The expenditure per pupil for the salaries of high school teachers varies from one and one half to four times the cost per pupil for salaries of teachers in the elementary schools.

In our consideration of relationships we found that an expensive school system is one that spends more than the usual amount for all of the principal items of expense. A large positive relation-

ship exists between the proportion spent for supervision and the proportion spent for text-books and supplies. A lack of relationship between the total cost per pupil and the proportion which is spent for teaching and supervision seems to indicate that additional expenditures may not mean, as they should, a greater proportion for those items which count most for the efficiency of the schools.

These and the many other facts which are given above concerning the variability and interrelation of the principal items of expense for schools, prove conclusively that the problem of the business administration of city school systems is not only a real and vital one, but also that we may expect that the schools will increase in efficiency when the money devoted to public education is distributed among the various items in the best possible way. As has been stated, our final test can only be found by testing the pupils in the schools in order to rate different systems for efficiency, and then we must conclude that those cities which get the best results for a given expenditure per pupil are the cities which properly distribute their money. However, before any such comparison among the various cities can be made, we must have more detailed information with regard to the way in which the money is used. If we may not ask city superintendents or boards of education to report their expenditures according to a certain fixed form, it does seem that we might insist that their reports tell us for just what purposes the money is spent. A report which gave the various items of expense in detail would enable any one to compare cities according to whatever classification seemed best. Nor would such reports be without their value to the persons making them. If the administrator of schools is to secure additional money, either for purposes for which money is already used, or for any new field of activity, he can have no better argument than to be able to show just what results are obtained in his own and other cities from a

given expenditure. Suppose, for example, that a superintendent wishes to introduce manual training or domestic science; he will be met immediately by the statement that these "fads" are expensive and not at all necessary as a part of public education. Now, if it were possible for him to show from the reports of other cities that the additional expenditure was comparatively small, and that results obtained in the way of retaining pupils in school were considerable, he could make an argument which would have some weight.

If the greatest economy is to be had, it is essential that the accounting should show just how much money is spent for each item, and, within a system itself, how various schools compare. It should be possible for the administrative officer to tell just what the cost per pupil is for each school within the system, and to compare the relative cost with the relative efficiency as found by testing the pupils of each school. No great corporation would to-day continue to spend money for purposes for which no results could be shown, and no school system should so report its expenditures that it is impossible to tell how much the educational policies cost which it advocates and carries out.

It seems hardly right to expect that a superintendent whose time is already overcrowded, and who has as his assistant a clerk worth $500 a year, should be asked or expected to originate or carry out any such policy of accounting as has been suggested above. But when we recall again the great variability which is found for those items of expense which might be expected to be fairly constant, we feel that it is not out of place to suggest that the salary of a competent business agent or director might be paid out of the savings which would be made by the proper administration of the business affairs of the schools, and that the efficiency of the schools might be increased as the result of the proper distribution of the money spent. When the best judgment is used in the purchase and use of supplies and equipment as well as in

the selection of teachers and supervisors of instruction, when the money which is spent for schools is properly distributed among the various items of the budget, when expenditures are shown in reports in connection with the results obtained, then our schools will be found to have improved in efficiency, and then they will be able to command the respect and increased support of the community.

## § 23. Expenditures for Schools in Relation to Other Municipal Expenditures

The fiscal problem in education involves not only a consideration of the proper administration of the funds set aside for schools, but also the possible increase in revenue devoted to education. The greater demand made upon our public schools, due to the development of superior facilities for the type of education which has long been thought necessary and to the very great increase in the number and kind of activities undertaken by our schools, has led everywhere to an increase in school expenditures. The study of the fiscal problem when viewed merely from the standpoint of expenditure may be summed up in an accurate and detailed statement of the results secured for the money spent. From the standpoint of increasing school revenue the problems must be stated in terms of school needs in relation to amount of increase in revenue desired.

If the resources of our society were unlimited the problem of securing adequate support for education would be very simple. A need once recognized would be met by a grant of sufficient funds. As the situation actually is the ability of any community to satisfy the demand for increased support for schools must be judged in terms of the whole community fiscal problem. Many American communities are poor, some are, for various reasons, almost bankrupt. The ability to raise money is limited. Of the total amount of revenue collected only a part can be spent for schools. It is quite as important for a community to maintain a police force and a fire department as it is to have schools. Money spent for paving, sewage systems, hospitals, proper handling of contagious disease, inspection of meat and milk and the like, cannot advantageously be withdrawn for any other use.

The expedient of rendering the schools independent of the general municipal government by creating a board with power to levy and collect taxes as well as to manage the schools, seems to

the writer to be open to serious criticism. It is true that under this form of control schools may receive, for a time at least, more money than they could hope for from the general administration. It has often been contended that our schools have almost invariably been administered honestly. Granting both of these arguments, the fact remains that the schools represent only one type of community activity and ought not to draw from the resources of the community to such an extent as to cripple other agencies of vital importance to the welfare of the group. Then, too, there is an undoubted value in placing those who administer schools in a position in which they are called upon to justify the use of money already granted and to show clearly the needs which lie back of the demand for increased support. We may not hope for the highest type of efficiency from any man or group of men who lack the stimulus which is found in a close and continual scrutiny of their public acts. School boards and school superintendents are not exceptions to this rule.

The only adequate study of city expenditures, with special reference to the money spent for schools, is Professor E. C. Elliott's "Some Fiscal Aspects of Education." The remainder of this section will consist mainly of tables of results from this investigation. Professor Elliott's data were secured from the bulletins, numbers 36 and 42, of the Department of Labor issued in September 1901 and 1902 and from bulletin 20, of the Bureau of the Census issued in 1905. The classification used by the Department of Labor is modified and improved in the later publication of the Bureau of the Census but not so greatly as to invalidate comparisons among the results secured from the two sets of data. The following parts of tables from Professor Elliott's study give the two classifications and at the same time show the data derived from the original data expressed as percentages of the total amount expended instead of amount in dollars as found in the original tables.

TABLE

SHOWING PERCENTAGES OF TOTAL AMOUNT EXPENDED FOR MAINTENANCE AND OPERATION ALL CITIES IN THE UNITED STATES

| | CITY | Police Department | Police Courts, Jails, etc. | Fire Department | Health Department | Hospitals, Asylums, Almshouses, etc. | Schools | Libraries, Art Galleries, Museums, etc. | Parks and Gardens | Sewers | Municipal Lighting |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | New York, N. Y. | 10.15 | .791 | 4.66 | .924 | 4.66 | 14.9 | .555 | 1.72 | .648 | 2.45 |
| 2 | Chicago, Ill. | 19.30 | 1.460 | 8.30 | .878 | .04 | 31.8 | .894 | 3.30 | 2.00 | 2.19 |
| 3 | Philadelphia, Pa. | 14.30 | 2.640 | 5.02 | 1.480 | 2.49 | 17.1 | 1.33 | 2.63 | .432 | 5.75 |
| 4 | St. Louis, Mo. | 17.80 | 1.270 | 8.01 | .420 | 6.14 | 16.8 | .453 | 1.29 | 1.12 | 5.72 |
| 5 | Boston, Mass. | 8.66 | 6.660 | 6.26 | .824 | 6.16 | 15.4 | 1.61 | 2.50 | 1.88 | 3.77 |
| 6 | Baltimore, Md. | 11.20 | 2.770 | 5.84 | .995 | 4.07 | 15.4 | .034 | 3.29 | .418 | 5.22 |
| 7 | Cleveland, Ohio | 8.64 | 1.910 | 9.83 | 1.540 | 2.73 | 23.7 | 1.65 | .786 | .694 | 5.15 |
| 8 | Buffalo, N. Y. | 13.10 | .406 | 11.00 | .725 | 2.60 | 19.1 | 1.65 | 3.21 | .197 | 5.79 |
| 9 | San Francisco, Cal. | 14.80 | 1.980 | 9.88 | 1.660 | 3.82 | 20.9 | .754 | 2.66 | .824 | 3.94 |
| 10 | Cincinnati, Ohio. | 9.88 | 1.840 | 8.13 | .677 | 3.45 | 17.3 | 1.13 | .611 | .696 | 5.56 |
| 11 | Pittsburg, Pa. | 8.07 | | 7.85 | 1.310 | 2.25 | 13.5 | 1.03 | 2.88 | 1.11 | 4.75 |
| 12 | New Orleans, La. | 5.60 | 1.330 | 6.24 | 1.190 | 1.18 | 10.4 | .173 | .205 | | 5.14 |
| 13 | Detroit, Mich. | 16.00 | .341 | 14.60 | 1.030 | 2.09 | 23.9 | 1.79 | 2.89 | 1.41 | |
| 14 | Milwaukee, Wis. | 9.32 | .507 | 11.40 | .979 | .36 | 21.1 | 1.60 | 1.86 | 1.40 | 6.25 |
| 15 | Washington, D. C. | 13.00 | 6.790 | 4.60 | 1.350 | 7.50 | 21.7 | .140 | 1.16 | 1.39 | 4.62 |
| 16 | Newark, N. J. | 8.55 | | 5.88 | 1.190 | 4.25 | 18.3 | .713 | .0937 | 1.27 | 4.37 |
| 17 | Jersey City, N. J. | 9.94 | .234 | 5.28 | .176 | .73 | 11.0 | .763 | .142 | .448 | 3.99 |
| 18 | Louisville, Ky. | 9.77 | 3.770 | 8.96 | .301 | 2.23 | 17.9 | | 1.70 | .497 | 4.87 |
| 19 | Minneapolis, Minn. | 7.36 | .537 | 11.20 | .842 | 3.03 | 25.6 | 1.43 | 2.51 | 1.26 | 5.12 |
| 20 | Providence, R. I. | 9.56 | .120 | 9.41 | .451 | 1.06 | 17.9 | .331 | 1.19 | 1.74 | 8.04 |
| 21 | Indianapolis, Ind. | 9.02 | .160 | 10.10 | .722 | 2.42 | 33.2 | 2.82 | 4.48 | 4.77 | 6.73 |
| 22 | Kansas City, Mo. | 11.90 | 1.160 | 11.90 | 1.960 | .16 | 26.5 | .963 | 2.39 | .424 | 4.06 |
| 23 | St. Paul, Minn. | 7.70 | 1.640 | 8.25 | .377 | 1.00 | 19.0 | .615 | 2.40 | .714 | 8.06 |
| 24 | Rochester, N. Y. | 5.54 | .435 | 6.68 | 1.240 | 3.15 | 16.1 | .077 | .787 | .0997 | 7.87 |
| 25 | Denver, Col. | 7.56 | .724 | 8.35 | 1.520 | 1.87 | 37.2 | 1.27 | 3.64 | .831 | 5.88 |
| 26 | Toledo, Ohio | 6.96 | 1.870 | 7.57 | 1.040 | (a) | 25.9 | .732 | 1.17 | .872 | 5.14 |
| 27 | Allegheny, Pa. | 6.85 | | 6.67 | .763 | 3.55 | 17.3 | 1.15 | 1.37 | .754 | |
| 28 | Columbus, Ohio | 7.05 | 1.010 | 9.56 | 1.290 | .66 | 22.5 | .522 | .535 | .658 | 3.53 |
| 29 | Worcester, Mass. | 5.65 | | 6.36 | 1.110 | 5.56 | 21.2 | 1.58 | 1.04 | 11.5 | 4.61 |
| 30 | Syracuse, N. Y. | 7.57 | .735 | 9.22 | .817 | 5.86 | 21.8 | 1.93 | 1.91 | | 5.90 |
| 31 | New Haven, Conn. | 13.50 | .967 | 9.78 | .538 | 5.25 | 26.6 | 1.13 | 1.41 | .798 | 5.46 |
| 32 | Paterson, N. J. | 9.99 | .299 | 10.10 | .584 | 5.22 | 25.2 | 1.56 | 2.44 | .954 | 6.41 |
| 33 | Fall River, Mass. | 8.54 | | 7.57 | .933 | 8.22 | 18.1 | 1.01 | .186 | | 6.01 |
| 34 | St. Joseph, Mo. | 12.60 | 1.250 | 12.90 | 1.680 | .41 | 28.4 | 1.22 | 1.14 | .825 | |
| 35 | Omaha, Neb. | 5.42 | .739 | 8.11 | .539 | .30 | 25.6 | 1.29 | 1.29 | 1.93 | 5.32 |
| 36 | Los Angeles, Cal. | 9.57 | .719 | 9.14 | .914 | .29 | 32.7 | 1.39 | 4.08 | .306 | 3.27 |
| 37 | Memphis, Tenn. | 11.20 | | 9.41 | 7.460 | 3.55 | 15.9 | .698 | .229 | | 5.17 |
| 38 | Scranton, Pa. | 8.05 | .519 | 7.39 | .709 | | 48.6 | 1.42 | .641 | 1.03 | 6.37 |
| 39 | Lowell, Mass. | 10.20 | | 8.69 | 2.34 | 9.27 | 24.7 | 1.05 | .959 | 1.16 | 6.56 |
| 40 | Albany, N. Y. | 11.40 | .461 | 9.92 | .929 | 4.81 | 22.5 | .416 | 2.56 | .124 | 5.12 |
| 41 | Cambridge, Mass. | 5.71 | | 4.17 | .922 | 4.89 | 21.4 | .700 | .928 | 4.30 | 3.25 |
| 42 | Portland, Ore. | 4.94 | .305 | 7.40 | .320 | .37 | 22.9 | | .807 | .366 | 4.32 |
| 43 | Atlanta, Ga. | 13.70 | | 10.60 | 10.60 | 4.83 | 14.5 | .481 | 1.38 | .586 | 7.09 |
| 44 | Grand Rapids, Mich. | 7.94 | .968 | 11.40 | 1.260 | 2.12 | 28.1 | .694 | 2.16 | .739 | |
| 45 | Dayton, Ohio | 7.84 | 1.630 | 8.65 | .584 | 1.39 | 32.7 | 1.02 | .245 | .258 | 5.19 |
| 46 | Richmond, Va. | 8.38 | .337 | 7.45 | .743 | 3.24 | 10.6 | .411 | 3.02 | .152 | 2.58 |
| 47 | Nashville, Tenn. | 10.60 | .501 | 10.20 | 2.220 | 2.55 | 20.7 | .310 | | .124 | 5.63 |
| 48 | Seattle, Wash. | 5.84 | .733 | 7.94 | .934 | .38 | 18.9 | 1.06 | .501 | .305 | 1.94 |
| 49 | Hartford, Conn. | 9.24 | .652 | 9.06 | .915 | 6.64 | 24.2 | .827 | 1.83 | .591 | 4.31 |
| 50 | Reading, Pa. | 9.38 | | 6.51 | .505 | | 28.2 | .528 | 1.77 | 4.67 | 9.08 |
| 51 | Wilmington, Del. | 12.40 | .614 | 5.71 | 1.200 | .13 | 25.9 | 1.04 | 2.02 | .526 | 7.06 |
| 52 | Camden, N. J. | 13.40 | .611 | 10.20 | .476 | 1.35 | 24.7 | .132 | .159 | .136 | 9.58 |
| 53 | Trenton, N. J. | 11.20 | .470 | 9.81 | .716 | 2.29 | 21.1 | .573 | 1.57 | .942 | 2.65 |
| 54 | Bridgeport, Conn. | 8.27 | 1.070 | 9.98 | .921 | 8.07 | 23.4 | 1.73 | 2.68 | .863 | 7.51 |
| 55 | Lynn, Mass. | 6.14 | | 7.18 | .857 | 7.79 | 18.4 | 1.77 | .511 | .888 | 3.94 |
| 56 | Oakland, Cal. | 12.80 | 1.200 | 11.40 | 1.430 | .30 | 37.6 | 1.82 | 1.33 | .673 | 8.62 |
| 57 | Lawrence, Mass. | 7.33 | | 6.68 | 4.950 | 7.83 | 21.2 | 1.48 | .716 | .953 | 4.07 |
| 58 | New Bedford, Mass. | 11.00 | | 7.22 | .769 | 5.66 | 20.2 | 1.42 | 1.89 | .788 | 4.93 |
| 59 | Des Moines, Iowa. | 5.96 | .791 | 9.71 | 1.900 | .34 | 40.7 | 1.14 | 2.10 | 1.99 | 6.85 |
| 60 | Springfield, Mass. | 5.12 | | 7.96 | .498 | 4.39 | 26.7 | 2.40 | 1.98 | .409 | 4.89 |
| 61 | Somerville, Mass. | 5.33 | | 5.39 | .933 | 3.13 | 25.0 | 1.22 | .934 | .839 | 4.76 |
| 62 | Troy, N. Y. | 11.60 | .469 | 6.60 | 1.340 | 10.60 | 18.7 | | .269 | .466 | 7.67 |
| 63 | Hoboken, N. J. | 14.10 | .444 | 9.96 | .705 | 2.36 | 24.0 | 1.05 | .588 | .743 | 3.30 |
| 64 | Evansville, Ind. | 9.15 | 427 | 10.20 | .499 | .17 | 31.9 | | .196 | .404 | 5.77 |
| 65 | Manchester, N. H. | 6.53 | .452 | 13.00 | 1.290 | 3.33 | 18.7 | .839 | .866 | .59 | 8.96 |
| 66 | Utica, N. Y. | 6.28 | .363 | 10.70 | 1.200 | 2.57 | 24.3 | 1.04 | .437 | .706 | 9.53 |
| 67 | Peoria, Ill. | 9.56 | 2.440 | 9.81 | 1.140 | | 31.4 | 1.82 | 1.95 | .942 | 7.21 |
| 68 | Charleston, S. C. | 12.70 | | 8.30 | 2.000 | 11.50 | 12.3 | .081 | 1.05 | 1.53 | 4.90 |

(a) Less than .01.

[1] Percentages obtained from data published in Bulletin 36 of

DEVOTED TO EACH OF THE MUNICIPAL DEPARTMENTS FOR THE FISCAL YEAR 1900 1
ABOVE 30,000 POPULATION

| Street Cleaning and Sprinkling | Other Street Expenditures | Garbage Removal | Interest on Debt | Waterworks | Gas-works | Electric-light Plants | Docks and Wharves | Ferries and Bridges | Markets | Cemeteries | Baths | Other Items | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4.10 | 1.84 | 1.04 | 13.12 | 3.22 | | | .656 | .360 | .067 | | .048 | 33.69 | 1 |
| 3.02 | 1.50 | 2.25 | 6.73 | 6.36 | | 1.54 | .101 | 1.030 | .017 | | .054 | 7.27 | 2 |
| 1.63 | 3.59 | 2.96 | 10.90 | 7.79 | | | .024 | 5.210 | .023 | | .495 | 19.30 | 3 |
| 3.32 | 3.57 | 2.15 | 8.66 | 6.70 | | | .660 | .379 | .073 | | | 14.50 | 4 |
| 2.67 | 7.32 | 3.16 | 11.10 | 6.47 | | | | 2.040 | .142 | .332 | .572 | 12.40 | 5 |
| 2.67 | 2.19 | 2.22 | 20.10 | 3.62 | | | .056 | .286 | .069 | | .054 | 19.50 | 6 |
| 1.20 | 1.99 | 1.50 | 14.40 | 5.89 | | | | 2.250 | .450 | .648 | | 15.10 | 7 |
| 2.98 | 4.02 | 1.86 | 10.90 | 5.86 | | | .756 | .179 | .230 | .001 | .01 | 15.40 | 8 |
| 2.70 | 3.13 | | .25 | | | | | .096 | | | | 32.50 | 9 |
| 3.29 | 1.68 | .42 | 28.90 | 7.85 | | | .080 | .445 | .221 | | | 7.83 | 10 |
| 2.47 | 4.25 | 1.40 | 12.40 | 4.65 | | | .382 | .757 | .288 | | | 30.80 | 11 |
| 2.94 | .26 | 2.49 | 14.70 | | | | | | | | | 48.20 | 12 |
| 4.69 | 11.50 | 1.79 | 8.64 | 3.60 | | 3.34 | | .589 | .070 | | | 1.71 | 13 |
| 5.16 | 3.80 | 4.80 | 9.22 | 4.46 | | | .078 | 1.720 | | | .325 | 15.80 | 14 |
| 3.48 | 6.42 | 1.14 | 8.43 | 3.32 | | | | .651 | .134 | | .020 | 14.10 | 15 |
| 2.54 | | 1.38 | 8.37 | 6.96 | | | | | .415 | | .121 | 35.70 | 16 |
| 1.47 | 2.99 | | 23.20 | 8.96 | | | .073 | | | | | 30.70 | 17 |
| 3.60 | 5.59 | | 17.60 | 4.91 | | | .279 | | | | | 17.90 | 18 |
| 5.90 | 2.03 | | 12.90 | 3.74 | | | | .365 | | | | 16.30 | 19 |
| 1.73 | 5.57 | .698 | 20.50 | 2.64 | | | | .636 | | .626 | | 17.90 | 20 |
| 5.36 | 1.54 | 2.53 | 7.72 | .18 | | | | .301 | .632 | | | 11.80 | 21 |
| 4.41 | 1.15 | .94 | 12.00 | 8.48 | | | | .238 | .088 | | | 11.50 | 22 |
| 4.34 | 3.36 | .88 | 22.50 | 3.47 | | | | 2.730 | | | | 12.80 | 23 |
| 3.10 | 1.89 | 2.69 | 21.80 | 2.58 | | | | .595 | | 1.120 | | 24.20 | 24 |
| 4.18 | .952 | .52 | 7.60 | | | | | .017 | .382 | | | 17.40 | 25 |
| 2.53 | 4.79 | .81 | 21.10 | 4.81 | 1.24 | | | 1.380 | .513 | .626 | | 11.30 | 26 |
| 2.73 | 5.53 | 1.59 | 14.00 | 12.50 | | 4.21 | .170 | | .321 | | | 20.70 | 27 |
| 3.96 | .82 | .81 | 21.10 | 6.91 | | .020 | | | .451 | | | 18.50 | 28 |
| 2.90 | 8.72 | .70 | 14.90 | 2.56 | | | | | | | .020 | 11.50 | 29 |
| 5.01 | 3.66 | 4.05 | 15.20 | 5.52 | | | | 1.610 | .275 | .077 | .283 | 8.63 | 30 |
| 6.45 | 3.89 | .39 | 10.50 | | | | | .772 | | | | 12.40 | 31 |
| 4.60 | 5.09 | 2.78 | 12.30 | | | | | | | | | 12.50 | 32 |
| 2.54 | 7.17 | 2.01 | 8.29 | 9.66 | | | | | | 1.380 | | 18.30 | 33 |
| 2.46 | 4.81 | | 15.80 | | | 5.58 | | .206 | | | | 10.70 | 34 |
| 1.62 | 2.52 | | 20.20 | | | | | | .148 | | | 24.90 | 35 |
| 6.49 | 5.91 | .82 | 4.89 | | | | | | | | | 19.40 | 36 |
| 3.06 | 10.33 | | 18.60 | | | | .766 | 2.350 | .668 | | | 10.60 | 37 |
| 1.85 | 2.06 | .43 | 8.06 | | | | | .694 | | | | 12.30 | 38 |
| 2.35 | 2.21 | 1.41 | 13.70 | 6.38 | | | | | | .709 | | 8.09 | 39 |
| 2.49 | 2.27 | .03 | 16.60 | 9.23 | | | | .377 | .118 | | | 10.70 | 40 |
| 2.79 | 7.06 | 2.49 | 14.70 | 3.37 | | | | 2.360 | | .826 | .061 | 19.90 | 41 |
| 3.18 | 1.00 | .36 | 27.00 | 3.66 | | | | | | | | 23.00 | 42 |
| | 4.20 | | 14.50 | 5.87 | | | | .145 | | .837 | | 11.00 | 43 |
| 3.69 | .68 | .44 | 7.50 | 8.93 | | 2.22 | | .154 | .373 | 1.950 | | 18.70 | 44 |
| 2.31 | 2.61 | 2.05 | 19.80 | 4.46 | | | | 1.580 | .669 | | | 7.02 | 45 |
| 2.81 | 3.36 | 1.62 | 30.90 | 3.14 | 11.90 | | | .292 | .497 | .717 | | 7.60 | 46 |
| 1.62 | 6.81 | 3.74 | 20.60 | 6.82 | | | | | .343 | | | 7.17 | 47 |
| .854 | 2.05 | .06 | 20.30 | 7.14 | | | .181 | .035 | | | | 30.60 | 48 |
| 4.72 | 13.6 | 1.87 | 13.10 | 4.59 | | | | .835 | | 422 | .181 | 2.61 | 49 |
| 2.26 | 3.84 | 2.83 | 8.37 | 8.32 | | | | | .157 | | | 13.50 | 50 |
| 2.35 | 3.34 | 4.18 | 13.50 | 9.27 | | | | | | | .038 | 10.70 | 51 |
| 1.57 | 3.77 | 1.09 | 16.70 | 9.49 | | | | | | | | 6.54 | 52 |
| 2.43 | 2.11 | 1.46 | 20.10 | 7.46 | | | | | | | | 15.10 | 53 |
| 3.48 | 6.19 | 3.28 | 9.12 | | | | | .575 | | | | 13.00 | 54 |
| 1.55 | 6.21 | 2.61 | 15.40 | 4.68 | | | | | | 2.190 | | 19.60 | 55 |
| 6.94 | 2.64 | | 3.39 | | | | .429 | | | | | 9.44 | 56 |
| 2.38 | 5.48 | 1.37 | 13.00 | 7.22 | | | | .371 | | 1.300 | | 13.60 | 57 |
| 1.10 | 5.51 | 2.24 | 16.90 | 4.45 | | | .624 | .168 | | 2.89 | .071 | 11.90 | 58 |
| 2.24 | 1.46 | | 4.59 | | | | | 1.950 | | 1.24 | .151 | 16.90 | 59 |
| 3.43 | 3.32 | 1.80 | 11.10 | 3.94 | | | | | | | | 22.20 | 60 |
| 1.62 | 6.09 | 1.89 | 6.29 | 5.73 | | | | .039 | | | | 31.20 | 61 |
| 9.86 | .63 | 4.55 | 7.92 | 8.65 | | | .013 | .041 | .040 | .096 | | 10.40 | 62 |
| 1.61 | .25 | .48 | 8.49 | 21.10 | | | | | | .475 | .203 | 10.00 | 63 |
| 1.64 | 1.32 | .62 | 18.60 | 7.14 | | | .111 | .077 | .311 | | | 11.40 | 64 |
| 2.15 | 12.20 | 2.68 | 13.10 | 3.88 | | | | | | 1.980 | | 9.50 | 65 |
| 4.00 | 1.72 | 1.73 | 3.15 | | | | | .328 | | | .065 | 29.10 | 66 |
| 2.62 | 3.53 | .12 | 8.89 | | | | .021 | 1.440 | | | | 17.20 | 67 |
| | 5.15 | 3.84 | 25.4 | | | | | | .056 | | | 10.80 | 68 |

The Department of Labor, September, 1901.

TABLE

SHOWING PERCENTAGES OF TOTAL PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES
CITIES BETWEEN 25,000

| | CITIES | General Administration | Courts | Police Department | Militia | Fire Department | Health Department |
|---|---|---|---|---|---|---|---|
| 1 | Schenectady, N. Y. | 11.54 | .67 | 11.87 | | 9.22 | 1.40 |
| 2 | Youngstown, Ohio. | 8.21 | .05 | 13.41 | | 9.92 | 2.56 |
| 3 | Holyoke, Mass. | 10.32 | .13 | 7.18 | .001 | 10.66 | 2.25 |
| 4 | Fort Wayne, Ind. | 6.83 | .28 | 9.34 | | 15.77 | 2.11 |
| 5 | Akron, Ohio. | 6.64 | .13 | 8.05 | .09 | 17.00 | 1.04 |
| 6 | Saginaw, Mich. | 9.24 | .67 | 8.54 | | 7.27 | .57 |
| 7 | Tacoma, Wash. | 6.45 | . 25 | 6.51 | | 8.73 | .82 |
| 8 | Covington, Ky. | 11.28 | 1.17 | 10.25 | | 9.10 | 1.72 |
| 9 | Lancaster, Pa. | 7.77 | | 1.08 | | 7.69 | .72 |
| 10 | Dallas, Tex. | 7.66 | .49 | 9.90 | | 11.02 | .18 |
| 11 | Lincoln, Nebr. | 8.08 | .35 | 4.69 | | 8.71 | .82 |
| 12 | Brockton, Mass. | 9.37 | | 7.44 | .32 | 9.20 | 1.59 |
| 13 | Pawtucket, R. I. | 8.86 | .07 | 8.10 | | 6.81 | .63 |
| 14 | Birmingham, Ala. | 7.52 | .69 | 12.32 | .07 | 13.45 | 1.97 |
| 15 | Little Rock, Ark. | 12.08 | .90 | 16.78 | | 15.05 | 1.96 |
| 16 | Spokane, Wash. | 7.96 | .42 | 5.35 | | 10.27 | 1.18 |
| 17 | Altoona, Pa. | 8.93 | | 5.36 | | 9.01 | .83 |
| 18 | Augusta, Ga. | | | | | | |
| 19 | Binghamton, N. Y. | 8.69 | 1.19 | 7.62 | | 6.79 | 1.28 |
| 20 | Mobile, Ala. | | | | | | |
| 21 | South Bend, Ind. | 7.94 | .32 | 9.49 | | 13.88 | .29 |
| 22 | Wheeling, W. Va. | 8.17 | .12 | 11.22 | | 13.47 | 1.47 |
| 23 | Springfield, Ohio | 7.88 | .65 | 7.57 | | 8.99 | 2.22 |
| 24 | Johnstown, Pa. | 6.10 | | 8.85 | | 5.89 | 1.53 |
| 25 | Haverhill, Mass. | 6.29 | | 6.98 | .19 | 9.98 | .97 |
| 26 | Topeka, Kan. | 7.52 | .37 | 6.76 | | 11.52 | 2.23 |
| 27 | Terre Haute, Ind. | 6.37 | .27 | 8.84 | | 19.43 | 3.33 |
| 28 | Allentown, Pa. | 7.09 | | 6.00 | | 9.61 | 2.10 |
| 29 | McKeesport, Pa. | 9.90 | | 11.18 | | 10.30 | 3.34 |
| 30 | Dubuque, Iowa. | 8.43 | .01 | 8.20 | | 10.08 | .61 |
| 31 | Butte, Mont. | 9.15 | .51 | 13.73 | | 12.48 | 1.26 |
| 32 | Davenport, Iowa. | 6.60 | .36 | 7.34 | | 13.52 | .87 |
| 33 | Quincy, Ill. | 5.93 | .37 | 8.03 | | 15.55 | .36 |
| 34 | Salem, Mass. | 7.18 | | 8.62 | .79 | 7.57 | 3.61 |
| 35 | Elmira, N. Y. | 11.35 | 1.21 | 8.18 | | 12.90 | 1.92 |
| 36 | Malden, Mass. | 5.09 | | 5.94 | .11 | 5.68 | 2.11 |
| 37 | Bayonne, N. J. | 9.46 | 1.49 | 13.13 | .11 | 2.99 | .90 |
| 38 | Superior, Wis. | 13.53 | .41 | 6.88 | | 18.37 | 2.98 |
| 39 | York, Pa. | 6.53 | | 8.65 | | 9.85 | 1.05 |
| 40 | Newton, Mass. | 7.67 | | 7.73 | .05 | 5.14 | .87 |
| 41 | East St. Louis, Ill. | 8.82 | 1.13 | 8.72 | | 9.98 | .87 |
| 42 | Springfield, Ill. | 8.55 | | 11.75 | | 15.48 | .85 |
| 43 | Chester, Pa. | 9.24 | | 9.30 | | 7.10 | 5.22 |
| 44 | Chelsea, Mass. | 5.78 | | 7.92 | .06 | 6.94 | 1.69 |
| 45 | Fitchburg, Mass. | 6.37 | | 8.31 | .07 | 8.26 | 1.48 |
| 46 | Knoxville, Tenn. | 8.10 | | 8.07 | | 12.38 | 4.33 |
| 47 | Rockford, Ill. | 5.32 | .26 | 7.00 | | 12.07 | .67 |
| 48 | Sioux City, Iowa. | 8.08 | .33 | 6.80 | | 7.38 | .84 |
| 49 | Montgomery, Ala. | 6.05 | .42 | 13.07 | | 8.10 | 3.05 |
| 50 | Taunton, Mass. | 6.90 | .19 | 8.71 | .19 | 6.22 | 1.90 |
| 51 | Newcastle, Pa. | 8.09 | .08 | 6.75 | | 10.75 | .77 |
| 52 | Passaic, N. J. | 8.96 | 1.35 | 6.11 | .10 | 8.29 | 1.36 |
| 53 | Atlantic City, N. J. | 7.96 | .82 | 11.58 | .01 | 14.25 | 1.67 |
| 54 | Canton, Ohio. | 5.88 | | 8.25 | | 11.19 | 1.44 |
| 55 | Jacksonville, Fla. | | | | | | |
| 56 | Galveston, Tex. | 8.54 | .26 | 9.78 | | 12.15 | 1.52 |
| 57 | Auburn, N. Y. | 9.38 | 1.15 | 7.01 | | 10.52 | .92 |
| 58 | Racine, Wis. | 6.24 | 1.03 | 4.13 | | 14.14 | 1.19 |
| 59 | South Omaha, Neb. | 12.16 | .89 | 7.12 | | 9.52 | 1.21 |
| 60 | Joplin, Mo. | 8.84 | .60 | 9.89 | | 13.85 | .92 |
| 61 | Joliet, Ill. | 6.92 | | 10.29 | | 9.49 | 1.98 |

From bulletin of Bureau of Census No. 20.

DEVOTED TO EACH OF THE ITEMIZED PURPOSES. AVERAGE FOR THE FISCAL YEARS 1902 AND 1903. AND 50,000 POPULATION

| Miscellaneous Public Safety | Charities and Corrections | Public Highways | Municipal Lighting | Public Sanitation | Schools | Libraries, Museums, etc. | Public Recreation | General | Corporate Interest | Service Transfers | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4.21 | 4.83 | 7.85 | 10.65 | 21.70 | .63 | .24 | .84 | 14.28 | .03 | 1 |
| | 2.64 | 3.86 | 5.51 | 6.86 | 37.05 | 1.02 | .47 | | 8.13 | | 2 |
| .35 | 7.82 | 7.02 | 3.90 | 4.39 | 26.66 | 1.36 | 1.23 | | 14.32 | 3.36 | 3 |
| | .05 | 4.89 | 8.28 | 6.00 | 33.02 | 1.35 | 3.06 | | 8.83 | | 4 |
| .33 | 3.30 | 7.79 | 8.08 | 1.48 | 37.05 | 1.73 | .60 | | 6.89 | | 5 |
| .06 | 3.23 | 14.37 | 3.93 | 3.62 | 36.05 | 1.07 | .32 | | 12.05 | | 6 |
| | .24 | 6.63 | | 1.33 | 28.50 | .98 | 2.01 | 1.92 | 35.70 | | 7 |
| | 3.10 | 4.44 | 6.41 | 6.11 | 24.70 | 1.20 | .03 | | 20.37 | .08 | 8 |
| | .54 | 12.26 | 13.95 | 5.97 | 32.32 | | .13 | | 8.64 | .09 | 9 |
| | 3.85 | 12.18 | 5.50 | 3.63 | 22.80 | .81 | .74 | .29 | 20.85 | | 10 |
| | .10 | 3.26 | 4.06 | 2.81 | 40.80 | 1.46 | .02 | | 24.77 | .08 | 11 |
| | 8.69 | 9.98 | 4.53 | 5.28 | 25.06 | 1.66 | .40 | 1.24 | 12.81 | 2.52 | 12 |
| .28 | 2.94 | 9.25 | 5.61 | 4.27 | 23.75 | 1.33 | .47 | | 25.06 | 2.61 | 13 |
| .08 | 1.94 | 10.96 | 3.60 | 4.14 | 13.72 | .04 | .63 | | 28.57 | .31 | 14 |
| | 3.88 | 9.03 | 2.27 | 1.71 | 30.30 | | 1.21 | | 3.48 | 1.18 | 15 |
| | 1.71 | 8.48 | 1.74 | 1.77 | 29.65 | .48 | 1.60 | 3.60 | 25.83 | | 16 |
| .84 | | 8.28 | 5.09 | 2.95 | 38.40 | | | | 20.25 | .02 | 17 |
| No | data for | schools | | | | | | | | | 18 |
| .30 | 13.35 | 9.30 | 9.12 | 2.79 | 31.90 | .001 | 1.03 | | 6.73 | | 19 |
| No | data for | schools | | | | | | | | | 20 |
| .31 | | 7.61 | 7.35 | 5.22 | 32.30 | 1.13 | 2.15 | .48 | 11.65 | .05 | 21 |
| | 1.68 | 4.88 | 7.84 | 6.12 | 33.67 | 1.71 | | | 9.15 | .58 | 22 |
| .05 | 2.81 | 4.00 | 12.43 | 7.98 | 31.90 | 1.38 | 1.96 | | 10.23 | | 23 |
| .20 | 4.71 | 11.85 | 6.44 | .001 | 47.05 | | .55 | | 6.87 | | 24 |
| .05 | 13.62 | 10.40 | 6.61 | 2.31 | 25.76 | 2.24 | 1.71 | .07 | 12.50 | .27 | 25 |
| | .56 | 9.86 | 3.72 | 1.60 | 41.76 | 1.22 | .61 | | 12.36 | | 26 |
| .16 | .51 | 2.69 | 7.71 | 5.59 | 39.35 | .73 | .49 | | 4.41 | | 27 |
| .45 | .10 | 8.19 | 7.45 | 3.39 | 42.88 | | .08 | | 12.60 | | 28 |
| .30 | 1.20 | 5.96 | 6.23 | 3.79 | 35.43 | .94 | | | 11.22 | | 29 |
| | | 8.09 | 7.22 | 4.56 | 29.98 | 1.33 | .45 | | 21.02 | | 30 |
| .02 | .84 | 8.71 | 4.08 | 3.55 | 36.35 | 2.79 | .05 | | 6.20 | .34 | 31 |
| .18 | | 9.42 | 8.16 | 7.79 | 37.10 | .95 | 3.22 | | 4.51 | | 32 |
| | 1.96 | 4.79 | 7.13 | 4.20 | 29.56 | 1.52 | 2.69 | | 18.05 | | 33 |
| .45 | 17.65 | 5.86 | 7.68 | 3.66 | 25.22 | 2.33 | 2.33 | | 6.97 | | 34 |
| .02 | 3.95 | 9.95 | 8.77 | 2.37 | 25.75 | .51 | 1.72 | .02 | 11.33 | | 35 |
| | 6.26 | 9.33 | 4.71 | 3.63 | 27.80 | 2.29 | .42 | 14.72 | 11.26 | .61 | 36 |
| | .87 | 6.43 | 7.34 | 2.14 | 32.77 | .87 | .40 | | 21.07 | | 37 |
| | 1.79 | 9.87 | 3.65 | 1.30 | 36.45 | 1.40 | | | 3.42 | | 38 |
| .06 | .70 | 9.19 | 9.03 | 7.59 | 37.55 | .12 | .79 | | 8.84 | | 39 |
| | 3.74 | 10.74 | 5.12 | 4.55 | 21.58 | 1.55 | .65 | 9.43 | 20.69 | .57 | 40 |
| | | 13.91 | 4.04 | 2.03 | 33.75 | 1.00 | .05 | | 15.65 | | 41 |
| .70 | 1.13 | 3.68 | 7.29 | 3.70 | 28.11 | .93 | 3.34 | 1.57 | 12.85 | .01 | 42 |
| | 4.45 | 3.75 | 8.16 | 3.44 | 34.92 | | .80 | | 13.75 | | 43 |
| .33 | 9.98 | 7.02 | 5.30 | 4.37 | 24.03 | .92 | .65 | 13.98 | 9.60 | 1.31 | 44 |
| | 11.79 | 11.35 | 6.82 | 3.07 | 26.28 | 1.59 | .82 | .32 | 13.35 | .02 | 45 |
| | 3.59 | 6.39 | 8.37 | 3.52 | 19.75 | | | | 25.54 | | 46 |
| | .73 | 6.88 | 9.10 | 5.85 | 40.70 | 3.43 | .26 | | 7.08 | | 47 |
| | .02 | 8.36 | 4.10 | 6.62 | 30.01 | .68 | .61 | | 26.12 | | 48 |
| | 2.10 | 7.78 | 5.41 | 3.43 | 12.87 | .30 | .79 | | 34.25 | 2.43 | 49 |
| .35 | 9.52 | 11.23 | 3.09 | 2.36 | 25.75 | 1.66 | .71 | .30 | 17.85 | 3.13 | 50 |
| | 5.97 | 7.95 | 1.17 | 3.67 | 47.25 | | .04 | | 7.60 | | 51 |
| .15 | 3.86 | 6.90 | 6.82 | 3.98 | 37.77 | 1.50 | 1.77 | 1.31 | 9.76 | | 52 |
| .22 | 4.46 | 5.20 | 6.74 | 13.30 | 16.76 | .54 | .33 | 1.13 | 15.16 | | 53 |
| .32 | 1.19 | 3.53 | 8.69 | 6.92 | 35.79 | .90 | 1.33 | .12 | 14.79 | | 54 |
| No | data for | schools | | | | | | | | | 55 |
| | 8.85 | 5.69 | 1.77 | 7.64 | 20.25 | .31 | .30 | | 22.95 | | 56 |
| | 7.96 | 8.42 | 9.27 | 4.54 | 29.50 | .62 | .04 | | 7.49 | 3.22 | 57 |
| | 4.17 | 13.27 | 5.28 | .21 | 39.20 | 3.03 | .03 | | 8.00 | | 58 |
| | 1.67 | 4.62 | 6.06 | .18 | 40.17 | .08 | .17 | | 16.31 | | 59 |
| | .74 | 10.30 | | .18 | 44.50 | 1.71 | .01 | 1.60 | 6.95 | | 60 |
| .80 | .79 | 7.12 | 7.47 | 6.63 | 38.42 | 1.91 | 2.00 | | 6.17 | | 61 |

TABLE 115

SHOWING PERCENTAGES OF TOTAL PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES CITIES BETWEEN 25,000

| | CITIES | General Administration | Courts | Police Department | Militia | Fire Department | Health Department |
|---|---|---|---|---|---|---|---|
| 62 | Chattanooga, Tenn. | 7.83 | .57 | 12.19 | | 15.72 | 3.02 |
| 63 | Woonsocket, R. I. | 6.76 | .06 | 8.24 | | 8.35 | 1.79 |
| 64 | Sacramento, Cal. | 8.50 | .85 | 8.90 | | 9.66 | 1.12 |
| 65 | La Crosse, Wis. | 10.45 | | 6.91 | | 13.39 | .86 |
| 66 | Oshkosh, Wis. | 9.88 | .50 | 5.52 | | 15.67 | 1.69 |
| 67 | Newport, Ky. | 8.86 | .26 | 8.53 | | 5.26 | 2.56 |
| 68 | Williamsport, Pa. | 9.42 | | 4.97 | | 12.48 | 1.13 |
| 69 | Pueblo, Col. | 11.02 | .20 | 8.00 | | 6.83 | 2.29 |
| 70 | Council Bluffs, Iowa. | 6.17 | .77 | 5.96 | | 16.73 | .12 |
| 71 | New Britain, Conn. | 5.46 | .82 | 6.23 | | 10.28 | 3.51 |
| 72 | Cedar Rapids, Iowa. | 6.45 | 1.10 | 6.68 | | 8.97 | 2.27 |
| 73 | Lexington, Ky. | 15.66 | 1.01 | 12.03 | .02 | 9.53 | 1.80 |
| 74 | Bay City, Mich. | 14.55 | .72 | 8.92 | | 10.68 | .24 |
| 75 | Fort Worth, Tex. | 7.15 | .30 | 7.62 | | 8.78 | .53 |
| 76 | Easton, Pa. | 7.40 | | 6.35 | | 9.12 | .40 |
| 77 | Gloucester, Mass. | 11.37 | | 7.88 | .20 | 9.53 | 1.83 |
| 78 | Jackson, Mich. | 9.03 | .95 | 8.16 | | 13.32 | .91 |

From the tables given above are derived tables of frequency, measures of variability and of relationship. The tables which follow are marked "L", for those derived from the data of the bulletins of the Department of Labor, and "C", for those derived from the data of the bulletin of the Bureau of the Census.

TABLE 116 (L)

TABLE OF MEASURES OF VARIABILITY OF PERCENTILE EXPENDITURES FOR MAINTENANCE AND OPERATION. ALL CITIES IN THE UNITED STATES ABOVE 30,000 POPULATION. FISCAL YEARS 1900 AND 1901

| | 50 % of the cases lie between | | | 2 P. E. |
|---|---|---|---|---|
| Police Department (average) | 6.93% | and | 9.82% | 1.89 |
| Police Department, Courts, Jails, etc. (1901) | 7.43 | " | 11.22 | 3.79 |
| Fire Department (average) | 6.72 | " | 9.70 | 2.98 |
| Municipal Lighting (1901) | 4.39 | " | 6.72 | 2.33 |
| Libraries, Museums, etc. (average) | .66 | " | 1.40 | .74 |
| Health Department (average) | .7 | " | 1.6 | .9 |
| Parks (1901) | .54 | " | 1.90 | 1.36 |
| Schools (average) | 19.65 | " | 30.58 | 10.97 |
| Interest on Debt (average) | 8.84 | " | 19.15 | 10.31 |

(*Continued*)

Devoted to Each of the Itemized Purposes. Average for the Fiscal Years 1902 and 1903. and 50,000 Population

| Miscellaneous Public Safety | Charities and Corrections | Public Highways | Municipal Lighting | Public Sanitation | Schools | Libraries, Museums, etc. | Public Recreation | General | Corporate Interest | Service Transfers | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| .18 | 7.52 | 3.90 | 6.70 | 5.19 | 17.90 | .16 | 2.03 | .17 | 16.85 | | 62 |
| | 5.75 | 10.09 | 5.91 | 3.68 | 20.57 | .24 | .09 | 3.15 | 22.27 | 2.99 | 63 |
| .21 | .36 | 12.60 | 8.05 | 8.39 | 35.30 | 2.46 | 1.20 | | 2.33 | | 64 |
| .06 | .06 | 5.23 | 5.79 | 3.17 | 39.27 | .55 | .31 | 6.59 | 7.48 | | 65 |
| | 3.74 | 12.93 | 5.62 | 1.56 | 33.57 | 2.26 | .78 | .06 | 6.35 | | 66 |
| .09 | 3.54 | 6.09 | 6.94 | 5.22 | 26.04 | 1.44 | .05 | | 35.42 | | 67 |
| | 8.09 | 6.24 | 7.56 | 2.25 | 35.94 | | .88 | | 10.80 | | 68 |
| | .46 | 11.50 | 4.04 | 1.61 | 33.27 | .80 | 3.81 | .15 | 12.52 | 3.44 | 69 |
| .26 | .14 | 5.07 | 4.72 | 2.27 | 42.82 | 1.50 | 2.30 | | 11.12 | | 70 |
| | | 6.30 | 6.19 | 6.04 | 38.26 | | .94 | | 15.90 | .06 | 71 |
| | .01 | 13.65 | 6.53 | 3.57 | 38.45 | 1.90 | 1.84 | .45 | 8.16 | | 72 |
| | 8.64 | 5.38 | 7.82 | 2.60 | 22.30 | .49 | .06 | | 12.65 | .01 | 73 |
| | .29 | 9.46 | | 4.80 | 33.61 | 1.05 | .57 | | 15.18 | | 74 |
| .16 | 1.01 | 10.36 | 1.03 | .76 | 18.45 | .89 | .33 | | 37.15 | 5.41 | 75 |
| | | 10.36 | .39 | 2.60 | 50.87 | 1.15 | .07 | | 11.25 | | 76 |
| .18 | 13.38 | 13.39 | 3.80 | .91 | 22.50 | | .40 | | 13.78 | | 77 |
| .03 | 6.10 | 12.85 | 6.52 | 4.79 | 27.60 | 1.49 | .50 | | 7.49 | .80 | 78 |

## TABLE 117 (C)

Table of Measures of Variability of Percentile Payments for General and Municipal Service Expenses. Seventy-five Cities Between 25,000 and 50,000 Population. Average of Fiscal Years 1902 and 1903

| | 50 % of the cases lie between | | | 2 P. E. |
|---|---|---|---|---|
| General Administration | 6.76% | and | 9.24% | 2.48% |
| Police Department | 6.98 | " | 9.49 | 2.51 |
| Fire Department | 8.71 | " | 12.99 | 4.28 |
| Health Department | .87 | " | 1.98 | 1.11 |
| Charities and Corrections | .79 | " | 5.75 | 4.99 |
| Public Highways | 6.00 | " | 10.30 | 4.30 |
| Street Lighting | 4.10 | " | 7.71 | 3.61 |
| Public Sanitation | 2.37 | " | 5.22 | 1.85 |
| Schools | 25.75 | " | 37.10 | 11.35 |
| Libraries | .73 | " | 1.55 | .77 |
| Public Recreation | .29 | " | 1.20 | .91 |
| Interest on Debt | 8.13 | " | 15.99 | 5.86 |

TABLE 118 (L)

TABLE OF MEDIANS, AVERAGE DEVIATIONS, STANDARD DEVIATIONS, AND COEFFICIENTS OF VARIABILITY. PERCENTILE EXPENDITURES FOR MAINTENANCE AND OPERATION. FISCAL YEARS 1900 AND 1901. ALL CITIES IN UNITED STATES ABOVE 30,000 POPULATION

| | Median | | Average Deviation | | Standard Deviation | | Coefficient of Variability | |
|---|---|---|---|---|---|---|---|---|
| | 1900 | 1901 | 1900 | 1901 | 1900 | 1901 | 1900 | 1901 |
| Police Department | 8.02 | 8.28 | 2.17 | 2.30 | 2.96 | 2.59 | .767 | .799 |
| Police Department, Courts, Jails, etc. | 8.82 | 8.88 | 2.49 | 2.37 | 3.37 | 3.20 | .839 | .795 |
| Fire Department | 8.23 | 8.46 | 1.99 | 1.80 | 2.45 | 2.28 | .693 | .619 |
| Health Department | .93 | 1.07 | .56 | .79 | .91 | 1.40 | .583 | .768 |
| Schools | 23.60 | 24.96 | 6.39 | 6.30 | 8.09 | 7.56 | 1.32 | 1.06 |
| Libraries, etc. | 1.02 | 1.02 | .48 | .44 | .58 | .55 | .483 | .442 |
| Parks | 1.04 | 1.04 | .84 | .80 | 1.16 | 1.06 | .82 | .784 |
| Street Lighting | 5.51 | 5.56 | 1.69 | 1.65 | 2.15 | 2.10 | .719 | .696 |

TABLE 119 (C)

TABLE OF MEDIANS, AVERAGE DEVIATIONS, STANDARD DEVIATIONS, AND COEFFICIENTS OF VARIABILITY. AVERAGE PERCENTILE PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES. FISCAL YEARS 1902 AND 1903. CITIES BETWEEN 25,000 AND 50,000 POPULATION

| | Median | Standard Deviation | Average Deviation | Coefficient of Variability |
|---|---|---|---|---|
| General Administration | 8.08 | 2.06 | 1.54 | .54 |
| Police Department | 8.16 | 2.38 | 1.74 | .609 |
| Fire Department | 9.98 | 3.31 | 2.58 | .817 |
| Health Department | 1.40 | .997 | .747 | .633 |
| Charities and Corrections | 3.02 | 4.04 | 2.98 | 1.71 |
| Public Highways | 8.19 | 2.99 | 2.52 | .908 |
| Street Lighting | 6.43 | 2.35 | 1.84 | .725 |
| Public Sanitation | 3.67 | 2.43 | 1.78 | .927 |
| Schools | 32.30 | 8.34 | 6.67 | 1.175 |
| Libraries | 1.14 | .727 | .56 | .524 |
| Public Recreation | .61 | .92 | .642 | .814 |
| Interest on Debt | 12.50 | 7.79 | 5.75 | 1.62 |

## TABLE 120 (L)

TABLE OF PEARSON COEFFICIENTS OF CORRELATION. PERCENTILE EXPENDITURES FOR MAINTENANCE AND OPERATION FOR THE FISCAL YEARS 1900 AND 1901. ALL CITIES IN THE UNITED STATES ABOVE 30,000 POPULATION

| | 1900 | 1901 | Average of 1900 and 1901 |
|---|---|---|---|
| Schools with— | | | |
| Police Department | +.0256 | —.149 | —.069 |
| Police Department, Courts, etc. | —.0459 | —.15 | —.0679 |
| Fire Department | +.203 | +.065 | +.0969 |
| Health | —.0243 | —.205 | —.0145 |
| Libraries and Museums | +.279 | +.315 | +.293 |
| Parks | +.031 | +.065 | +.0156 |
| Street Lighting | +.354 | +.336 | +.344 |
| Interest on Debt | | | —.482 |
| Other Expenditures | | | —.288 |
| Street Lighting Department with Police Department | | | +.0685 |
| Fire Department with Police Department, Courts, etc. | | | +.139 |

## TABLE 121 (L)

TABLE OF PEARSON COEFFICIENTS OF CORRELATION. PER CAPITA EXPENDITURES FOR MAINTENANCE AND OPERATION. ALL CITIES IN THE UNITED STATES ABOVE 30,000 POPULATION. FISCAL YEARS 1900 AND 1901

| | 1900 | 1901 |
|---|---|---|
| Schools with— | | |
| Police Department, Courts, etc. | +.232 | +.319 |
| Fire Department | +.444 | +.389 |
| Street Lighting | +.333 | +.361 |
| Assessed Valuation of Real and Personal Property | | +.45 |

## TABLE 122 (C)

TABLE OF PEARSON COEFFICIENTS OF CORRELATIONS. AVERAGE PERCENTILE PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES. FISCAL YEARS 1902 AND 1903, ALL CITIES BETWEEN 25,000 AND 50,000 POPULATION

| | |
|---|---|
| Schools with— | |
| General Administration | —.094 |
| Police Department | —.367 |
| Fire Department | +.088 |
| Health Department | —.187 |
| Charities and Corrections | —.371 |
| Public Highways | —.0004 |
| Street Lighting | +.246 |
| Public Sanitation | —.246 |
| Libraries and Museums | +.30 |
| Public Recreation | —.054 |
| Interest on Debt | —.541 |

TABLE 123 (L)

TABLE SHOWING GENERAL GROUP RELATIONSHIPS. SELECTION OF CITIES BASED ON PERCENTILE EXPENDITURES FOR SCHOOLS, AND MADE FROM ALL CITIES IN UNITED STATES HAVING A POPULATION OF 30,000 AND OVER. FISCAL YEAR 1901

Highest ten cities in percentile school expenditures:

| Number of City | Schools | Street Lighting | All Street Expenditures Except Lighting | Interest on Debt | Fire Department | Police Department, Courts, Jails, etc. |
|---|---|---|---|---|---|---|
| 111 | 46.8 | 8.26 | 7.05 | 12.80 | 4.57 | 8.18 |
| 87 | 44.16 | 7.20 | 3.21 | 5.69 | 10.86 | 9.27 |
| 114 | 38.80 | 2.79 | 9.02 | 5.08 | 7.30 | 7.65 |
| 81 | 42.49 | 5.40 | 7.48 | 14.50 | 8.21 | 10.90 |
| 38 | 41.40 | 6.14 | 9.81 | 7.43 | 7.50 | 8.13 |
| 56 | 40.90 | 8.74 | 8.17 | 3.26 | 10.50 | 9.99 |
| 113 | 39.74 | 8.46 | 4.95 | 13.52 | 8.04 | 5.58 |
| 75 | 38.80 | 10.80 | 12.22 | 6.56 | 9.66 | 9.71 |
| 100 | 38.41 | 4.99 | 6.43 | 2.79 | 14.44 | 15.54 |
| 119 | 37.69 | 11.32 | 7.77 | 9.70 | 6.85 | 10.18 |
| Median, | 41.15 | 7.73 | 7.62 | 6.12 | 8.12 | 9.85 |
| Average, | 41.42 | 7.41 | 7.61 | 8.13 | 8.79 | 9.51 |

Lowest ten cities in percentile school expenditures:

| | | | | | | |
|---|---|---|---|---|---|---|
| 37 | 15.40 | 5.40 | 14.43 | 17.60 | 10.00 | 11.10 |
| 43 | 14.32 | 6.48 | 8.74 | 12.31 | 10.11 | 12.15 |
| 17 | 13.90 | 4.48 | 6.76 | 27.61 | 6.70 | 11.71 |
| 5 | 13.07 | 3.60 | 11.65 | 15.49 | 5.87 | 13.17 |
| 99 | 12.30 | 4.18 | 7.36 | 28.91 | 9.28 | 14.34 |
| 68 | 12.76 | 4.49 | 6.64 | 25.66 | 7.94 | 14.78 |
| 12 | 11.12 | 5.03 | 3.69 | 18.60 | 6.20 | 6.24 |
| 133 | 10.26 | 5.54 | 8.80 | 30.85 | 7.84 | 11.45 |
| 46 | 9.83 | 2.71 | 8.02 | 29.78 | 7.34 | 8.60 |
| 80 | 6.96 | 1.96 | 11.80 | 29.45 | 5.52 | 7.29 |
| Median, | 12.53 | 4.49 | 7.06 | 28.26 | 7.59 | 11.58 |
| Average, | 11.99 | 4.39 | 8.49 | 23.63 | 7.68 | 11.08 |

TABLE 124 (C)

TABLE SHOWING GENERAL GROUP RELATIONSHIPS. SELECTION OF CITIES BASED ON PERCENTILE PAYMENTS FOR SCHOOLS, AND MADE FROM CITIES IN UNITED STATES HAVING A POPULATION OF 30,000 TO 50,000. AVERAGE FOR FISCAL YEARS 1902 AND 1903

Highest ten cities in percentile school expenditures:

| Number of City | Schools | General Administration | Police Department | Fire Department | Health Department | Charities and Corrections | Public Highways | Street Lighting | Public Sanitation | Libraries, Museums, etc. | Public Recreation | Interest on Debts |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 76 | 50.87 | 7.40 | 6.35 | 9.12 | .40 | | 10.36 | .39 | 2.60 | 1.15 | .07 | 11.25 |
| 51 | 47.25 | 8.09 | 6.75 | 10.75 | .77 | 5.97 | 7.95 | 1.17 | 3.67 | | .04 | 7.60 |
| 24 | 47.05 | 6.10 | 8.85 | 5.89 | 1.53 | 4.71 | 11.85 | 6.44 | .01 | | .55 | 6.87 |
| 60 | 44.50 | 8.84 | 9.89 | 13.85 | .92 | .74 | 10.30 | | .18 | 1.71 | .01 | 6.95 |
| 28 | 42.88 | 7.09 | 6.00 | 9.61 | 2.10 | .10 | 8.19 | 7.45 | 3.39 | | .08 | 12.60 |
| 70 | 42.82 | 6.17 | 5.96 | 16.73 | .12 | .14 | 5.07 | 4.72 | 2.27 | 1.50 | 2.30 | 11.12 |
| 26 | 41.76 | 7.52 | 6.76 | 11.52 | 2.23 | .56 | 9.86 | 3.72 | 1.60 | 1.22 | .61 | 12.36 |
| 11 | 40.80 | 8.08 | 4.69 | 8.71 | .82 | .10 | 3.26 | 4.06 | 2.81 | 1.46 | .02 | 24.77 |
| 47 | 40.70 | 5.32 | 7.00 | 12.07 | .67 | .73 | 6.88 | 9.10 | 5.85 | 3.43 | .26 | 7.68 |
| 59 | 40.17 | 12.16 | 7.12 | 9.52 | 1.21 | 1.67 | 4.62 | 6.06 | .18 | .08 | .17 | 16.31 |
| Median, | 42.85 | 7.46 | 6.76 | 10.18 | .87 | .73 | 8.07 | 4.72 | 2.44 | 1.46 | .13 | 11.19 |
| Average, | 43.88 | 7.68 | 6.94 | 10.78 | 1.08 | 1.63 | 7.83 | 4.80 | 2.26 | 1.51 | .41 | 11.75 |

Lowest ten cities in percentile school expenditures:

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 21.70 | 11.54 | 11.87 | 9.22 | 1.40 | 4.28 | 4.83 | 7.85 | 10.65 | .63 | .24 | 14.28 |
| 40 | 21.58 | 7.07 | 7.73 | 5.14 | .87 | 3.74 | 10.74 | 5.12 | 4.55 | 1.55 | .65 | 20.69 |
| 63 | 20.57 | 6.76 | 8.24 | 8.35 | 1.79 | 5.75 | 10.09 | 5.91 | 3.68 | .24 | .09 | 22.27 |
| 56 | 20.25 | 8.54 | 9.78 | 12.15 | 1.52 | 8.85 | 5.69 | 1.77 | 7.64 | .31 | .30 | 22.95 |
| 46 | 19.75 | 8.10 | 8.07 | 12.38 | 4.33 | 3.59 | 6.39 | 8.37 | 3.52 | | | 25.54 |
| 75 | 18.45 | 7.15 | 7.62 | 8.78 | .53 | 1.01 | 10.36 | 1.03 | .76 | .89 | .33 | 37.15 |
| 62 | 17.90 | 7.83 | 12.19 | 15.72 | 3.02 | 7.52 | 3.90 | 6.70 | 5.19 | .16 | 2.03 | 16.85 |
| 53 | 16.76 | 7.06 | 11.58 | 14.25 | 1.67 | 4.46 | 5.20 | 6.74 | 13.30 | .54 | .33 | 15.16 |
| 14 | 13.72 | 7.52 | 12.32 | 13.45 | 1.97 | 1.94 | 10.96 | 3.60 | 4.14 | .04 | .63 | 28.57 |
| 49 | 12.87 | 6.05 | 13.07 | 8.10 | 3.05 | 2.10 | 7.78 | 5.41 | 3.43 | .30 | .79 | 34.25 |
| Median, | 19.10 | 7.75 | 10.68 | 10.69 | 1.73 | 4.01 | 7.09 | 5.66 | 4.35 | .31 | .33 | 22.61 |
| Average, | 18.36 | 7.91 | 10.25 | 10.75 | 2.02 | 4.32 | 7.59 | 5.25 | 5.69 | .52 | .60 | 23.77 |

In his analysis of the causes of variability in percentile expenditure for schools Professor Elliott calls attention to many possible causes operating, of course, in varying degree, among the several cities making up the group studied. He expresses most adequately the lack of scientific management of municipal affairs in the following paragraph:

"A municipality is seldom economical in the expenditure of its revenues. It is far more often either parsimonious or extravagant. The recognition of the principle of expediency is much

more frequent than that of real worth, or of final utility. The cost of public service is doubled because of the price often paid to mediocrity, or on account of the tribute levied under a system of political feudalism. And this price is paid by reason of civic inertia and impotence, or because the standards of good service are not known. The social income is spent according to standards that *were* or *are*, and not according to standards that *ought to be*. A city is not a machine, and any description of the forces that make for progress or otherwise must keep in mind that human beings make up, and human minds direct, municipal affairs and set up civic standards."

Along with the study of school expenditures in relation to expenditures for various other sorts of municipal activity there is need for a companion study of sources of revenue. An interesting example of a partial study of this aspect of the fiscal problem is found in the report of the Commission Appointed to Study the System of Education in the Public Schools of Baltimore. The Commission found that Baltimore did not expend for its schools nor for its municipal affairs generally as much as the average or normal city. The following table and explanation taken from the report of this commission is suggestive.[1]

[1] Report of the Commission Appointed to Study the System of Education in the Public Schools of Baltimore. United States Bureau of Education, Bulletin, No. 4, 1911.

TABLE 125

TOTAL AMOUNTS AND AMOUNTS PER CAPITA RECEIVED FROM EACH OF THE PRINCIPAL SOURCES OF REVENUE IN 1908

[The amounts are taken from special reports of the Bureau of the Census: Statistics of Cities, 1908, pp. 192–193; the population figures from p. 343.]

| No. | Cities | Estimated Population | All Receipts | | Taxes | | Licenses and Permits | |
|---|---|---|---|---|---|---|---|---|
| | | | Total | Per Capita | Total | Per Capita | Total | Per Capita |
| 1 | Chicago, Ill. | 2,092,869 | $41,546,465 | $19.95 | $31,843,470 | $15.25 | $8,608,914 | $4.12 |
| 2 | St. Louis, Mo. | 665,802 | 13,799,932 | 20.71 | 11,773,339 | 17.67 | 1,495,724 | 2.25 |
| 3 | Cleveland, Ohio | 523,187 | 9,345,285 | 17.88 | 7,628,341 | 14.59 | 1,329,358 | 2.54 |
| 4 | Baltimore, Md. | 549,079 | 8,903,040 | 16.32 | 7,518,725 | 13.69 | 902,959 | 1.65 |
| 5 | Detroit, Mich. | 426,592 | 7,037,586 | 16.49 | 5,457,955 | 12.79 | 807,432 | 2.03 |
| 6 | Buffalo, N. Y. | 405,714 | 7,499,983 | 18.49 | 6,556,446 | 16.18 | 709,633 | 1.75 |
| 7 | San Francisco, Cal. | 402,836 | 9,385,013 | 23.35 | 7,073,395 | 17.55 | 1,582,537 | 3.93 |
| 8 | Milwaukee, Wis. | 350,852 | 6,142,214 | 17.50 | 4,859,602 | 13.87 | 869,525 | 2.48 |
| 9 | Newark, N. J. | 322,784 | 5,826,020 | 18.07 | 3,732,374 | 11.57 | 615,199 | 1.91 |
| 10 | New Orleans, La. | 329,207 | 5,848,151 | 17.79 | 4,771,561 | 14.50 | 734,212 | 2.23 |
| 11 | Washington, D. C. | 321,128 | 12,168,378 | 37.93 | 5,169,874 | 16.12 | 644,750 | 2.01 |
| 12 | Los Angeles, Cal. | 270,491 | 5,273,272 | 19.53 | 3,446,268 | 12.78 | 717,504 | 2.66 |
| 13 | Minneapolis, Minn. | 286,241 | 4,633,924 | 16.20 | 3,868,308 | 13.55 | 483,334 | 1.69 |

| No. | Cities | Estimated Population | Fines and Forfeits | | Subventions and Grants for Education | | Other Subventions and Grants and Gifts | |
|---|---|---|---|---|---|---|---|---|
| | | | Total | Per Capita | Total | Per Capita | Total | Per Capita |
| 1 | Chicago, Ill. | 2,092,869 | $548,790 | $0.263 | $340,585 | $0.164 | $204,706 | $0.099 |
| 2 | St. Louis, Mo. | 665,802 | 107,020 | .161 | 283,243 | .425 | 140,585 | .211 |
| 3 | Cleveland, Ohio | 523,187 | 23,901 | .457 | 251,565 | .481 | 111,115 | .213 |
| 4 | Baltimore, Md. | 549,079 | 9,569 | .174 | 531,787 | .969 | | |
| 5 | Detroit, Mich. | 426,592 | 12,334 | .289 | 670,119 | 1.570 | 29,746 | .069 |
| 6 | Buffalo, N. Y. | 405,714 | 35,020 | .086 | 145,798 | .359 | 53,086 | .131 |
| 7 | San Francisco, Cal. | 402,836 | 33,718 | .084 | 674,194 | .167 | 19,683 | .048 |
| 8 | Milwaukee, Wis. | 350,852 | 56,105 | .160 | 263,393 | .751 | 93,589 | .238 |
| 9 | Newark, N. J. | 322,784 | 23,672 | .073 | 1,360,293 | .421 | 94,482 | .293 |
| 10 | New Orleans, La. | 329,207 | 32,485 | .098 | 185,257 | .563 | 121,239 | .369 |
| 11 | Washington, D. C. | 321,128 | 112,087 | .349 | 2,697,137 | 8.403 | 3,543,064 | 1.103 |
| 12 | Los Angeles, Cal. | 270,491 | 66,147 | .245 | 1,020,542 | 3.813 | 13,721 | .051 |
| 13 | Minneapolis, Minn. | 286,241 | 57,616 | .202 | 210,196 | .735 | 14,380 | .050 |

"From the above table it will be seen that Baltimore, as compared with other cities, secured the smallest amount per capita from licenses and permits, was fifth in the amount per capita received from taxes, seventh in amount received from fines and forfeits, and tenth in amount per capita received from subven-

tions and grants from other civil divisions for education, while nothing was received from subventions and grants for other purposes. Had Baltimore received as much per capita from licenses and permits as the median city, about $318,000 would have been added to its resources in 1908; and had as much been raised per capita from taxes as the median city, about $445,000 would have been added to its available funds for 1908. While it is true, on the other hand, that the subvention received from the State for educational purposes was paid by this city, and still more in addition, as the State school tax, the same may be said of other cities. In fact it seems almost universally true that cities pay more into the State treasuries than they receive back from them, and it is altogether probable that Baltimore fares no worse in this respect than most cities."

That conditions are much the same now as when Professor Elliott made his investigation is indicated by the following tables from Dr. Updegraff's "Expenses of City School Systems" which is based on the latest data available.[1]

TABLE 126

DISTRIBUTION OF RATIOS OF TOTAL SCHOOL EXPENSES TO POPULATION

| Ratio | Number of Cities | | | | |
|---|---|---|---|---|---|
| | Group I | Group II | Group III | Group IV | Total |
| 1.50 to 1.99 | ..... | ..... | 3 | ..... | 3 |
| 2.00 to 2.49 | ..... | ..... | 2 | 2 | 4 |
| 2.50 to 2.99 | 1 | 3 | 3 | 5 | 12 |
| 3.00 to 3.49 | 1 | ..... | 10 | 4 | 15 |
| 3.50 to 3.99 | 2 | 4 | 8 | 6 | 20 |
| 4.00 to 4.49 | 3 | 7 | 6 | 6 | 22 |
| 4.50 to 4.99 | 4 | 3 | 5 | 2 | 14 |
| 5.00 to 5.49 | ..... | 2 | 1 | 3 | 6 |
| 5.50 to 5.99 | ..... | 1 | 2 | ..... | 3 |
| 6.00 to 6.49 | 2 | ..... | 2 | ..... | 4 |

[1] Harlan Updegraff, *A Study of Expenses of City School Systems*. U. S. Bureau of Education, Bulletin, 1912, No. 5.

TABLE 127

DISTRIBUTION OF RATIOS OF SCHOOL EXPENSES TO TOTAL CITY EXPENSES

| Ratio | Number of Cities | | | | |
|---|---|---|---|---|---|
| | Group I | Group II | Group III | Group IV | Total |
| .15 to .199 | ..... | ..... | 3 | 1 | 4 |
| .20 to .249 | 5 | 2 | 2 | 2 | 11 |
| .25 to .299 | 4 | 2 | 3 | 1 | 10 |
| .30 to .349 | 2 | 8 | 11 | 7 | 28 |
| .35 to .399 | 2 | 4 | 6 | 7 | 19 |
| .40 to .449 | ..... | 3 | 10 | 4 | 17 |
| .50 to .549 | ..... | 1 | 7 | 3 | 11 |
| .55 to .599 | ..... | ..... | ..... | 3 | 3 |

TABLE 128

DISTRIBUTION OF RATIOS OF SCHOOL EXPENSES TO EXPENSES FOR POLICE

| Ratio | Number of Cities | | | | |
|---|---|---|---|---|---|
| | Group I | Group II | Group III | Group IV | Total |
| 1.00 to 1.49 | 3 | ..... | 4 | 1 | 8 |
| 1.50 to 1.99 | 3 | 3 | ..... | 2 | 8 |
| 2.00 to 2.49 | 2 | 3 | 6 | 2 | 13 |
| 2.50 to 2.99 | 3 | 4 | 6 | 1 | 14 |
| 3.00 to 3.49 | 1 | 5 | 6 | 4 | 16 |
| 3.50 to 3.99 | ..... | 1 | 6 | 2 | 9 |
| 4.00 to 4.49 | 1 | 1 | 4 | 3 | 9 |
| 4.50 to 4.99 | ..... | 1 | 4 | 3 | 8 |
| 5.00 to 5.49 | ..... | ..... | 2 | 3 | 5 |
| 5.50 to 5.99 | ..... | ..... | 1 | 1 | 2 |
| 6.00 to 6.49 | ..... | 1 | 1 | 4 | 6 |
| 6.50 to 6.99 | ..... | ..... | ..... | ..... | ..... |
| 7.00 to 7.49 | ..... | 1 | 2 | ..... | 3 |
| 7.50 to 7.99 | ..... | ..... | ..... | 1 | 1 |
| 8.00 to 8.49 | ..... | ..... | ..... | 1 | 1 |

## § 24. The Apportionment of School Funds

We are in the habit of claiming that in our country there is equal opportunity for every boy or girl by reason of our great systems of free public education. Often we overlook the fact that communities differ very greatly in the educational opportunity which they offer. When we find a community in which the schools are markedly inferior, we are apt to characterize the place as unprogressive. The largest problem that we face in our state school systems is that of equalizing the educational opportunity offered to the children of the rural community, the village or town, and the city. Along with the shift of population from the country to the city there has come a corresponding concentration of wealth in these larger centers. Many communities are to-day poorer than they were fifty years ago, while on the other hand the per capita of other wealthy places may have increased ten or even fifty fold.

It has long been an accepted principle of taxation that ability to pay is the only adequate measure of the amounts of tax to be paid. The older idea that a man paid for certain benefits he received was essentially non-social and impossible of acceptance in a democratic society. State taxes for the support of public education have become the rule in our American Commonwealths, and yet there is as yet no commonly recognized principle of distribution which adequately equalizes the burden imposed upon the various civil divisions within the states. If men or communities should pay taxes in proportion to their ability to pay, it follows that a uniform state tax must be distributed on some basis other than that upon which the tax is levied in order to equalize the burden of taxation.

No one would to-day deny that education is a state function.

Indeed, if the national government had the power, it might be argued that the only adequate organization and support of education must be nation wide. Boys and girls do not stay where they grow up. Our population is mobile. The education received by A in a New England village community may make for his effective participation in the life of some other community within the state in which he lives, in some large city in New England, or in some remote section of the country. The fact the national government aids schools of agriculture and engineering and the agitation for a national subsidy for the teaching of industrial and household arts is not without significance in indicating possible future development. As the situation stands at present the equalization of opportunity in education as well as the equalization of the burden of taxation in support of schools rests almost wholly with our states. By means of state school taxes distributed in such a way as to equalize the burden which each community must bear, we may hope to secure a degree of equality of opportunity within our states which does not to-day exist.

The only adequate investigation of the apportionment of state school funds is Professor Ellwood P. Cubberley's [1905] "School Funds and Their Apportionment." In the pages which follow are given a few of the tables presented by Professor Cubberley in his most adequate treatment of this subject. The tables are in the main self-explanatory. The line of reasoning advanced will be best understood by presenting first Professor Cubberley's conclusions. The other order would, of course, be preferable were it possible to present here a more detailed abstract of the investigation.

"That of the different single bases used for the apportionment of funds, 'taxes-where-paid' and the property-valuation bases have no educational significance, and do not tend to equalize either the burdens or the advantages of education.

"That the use of total population as a basis of apportionment

while an improvement over 'taxes-where-paid' or property-valuation, is at best only a rough and unreliable method of approximately determining the number of children for whose education provision is to be made.

" That the use of the school census basis for the apportionment of funds, as required by so many state constitutions, and as used in whole or in part by thirty-eight different states, though an improvement over the other apportionment bases so far mentioned, is, nevertheless, one of the worst and most unjust bases of apportionment we have in use, and its complete abandonment in the future for some better single basis or for a combination basis plan is greatly to be desired.

" That total enrollment, enrollment for a definite period, average membership, average daily attendance, and aggregate days' attendance are each successive improvements over the census basis of apportionment, and each places a premium on more efforts which a community ought to be encouraged to make than the one preceding it.

" That all these bases are defective when used alone, because none make any better provision for the needs of the small school than is made under the census basis of apportionment, while aggregate days' attendance, used alone, would leave the small school in even worse financial condition.

" That the real unit of cost is the teacher who must be employed to teach the school, and not the children who may or do attend, and that the teacher actually employed should accordingly occupy a prominent place in any general apportionment plan, the remainder being given on a basis which considers regularity of attendance at the school.

" That more equitable results could be obtained by distributing all funds on the basis of teachers actually employed than on any other single basis and that the general adoption of this basis would be an improvement over the census basis, but that the

best results can only be obtained by a combination of two or more bases, and hence a combination basis type of apportionment is preferable to any single basis type.

" That, where the fund at hand for distribution is large enough to permit of the use of such a plan, the best basis for the distribution of funds is a combination of teacher-actually-employed and aggregate days' attendance (or average daily attendance multiplied by length of term).

" That if this combination basis of apportionment were adopted by many of the states now using the census basis of apportionment, the minimum demands of the states could, in most cases, be substantially increased without increasing the general school tax.

" That it is both just and desirable that the efforts made by communities to provide secondary education and many of the more recent advantages of education, such as kindergartens, manual training, evening schools, etc., should be recognized by the state in making the apportionment of funds, and that an incentive should be given to communities to provide these advantages for their children.

" That even after a distribution has been made on such a combination basis as that mentioned above there still probably would be heavy burdens to be borne by some poorer communities, in which case a certain "reserve fund" should be set aside, to be distributed by some responsible educational body, for the relief of those communities which have made the maximum effort allowed by law and yet are unable to meet the minimum demands of the state, and those whose peculiar circumstances make some additional assistance particularly desirable.

" That the state, in making the apportionment to the counties, ought to use as good an apportionment basis as is used by the counties themselves in making the apportionment to the townships or districts. The use of a good combination basis of appor-

tionment within the counties cannot overcome the inequalities created between the counties when the state apportionment is made on an essentially inferior basis, as for example, census. The best plan would seem to be that the state and county apportionments be made on essentially the same combinations basis, the state apportionment being made to the counties instead of to the townships or districts only that any county funds may first be added before making the township or district apportionment.

" In states having no state school tax and only a relatively small income from the permanent school fund of the state, this income ought to be reserved, in part at least, for use in aiding necessitous communities and as subsidies to encourage the introduction of new and desirable advantages, and it should not be distributed indiscriminately to all.

" That the present plans in use for the apportionment of school funds in fully three-fourths of the states of the Union are in need of careful revision, and that there is likewise need for a more careful study of this problem than has been given it so far by most of the states if it is desired that future evolution shall take place along more intelligent lines than has been the case in the past."

The tables which follow show clearly the inequalities due to the methods of distribution commonly used. One does not need to argue at length in favor of the plan suggested by Professor Cubberley of distributing on the per teacher actually employed and aggregate days attended bases. Teachers' salaries represent from sixty to eighty per cent of the school budget. Encouragement should certainly be given to those communities which keep children in school.

TABLE 129

AVERAGE VALUATION OF MASSACHUSETTS COUNTIES, PER CENSUS CHILD 5–15 YEARS OF AGE, WITH THE RATE OF INCREASE OR DECREASE [1]

| County | Census, 5–15 Years | | Av. Valuation per Census Child | | Rate of change | |
|---|---|---|---|---|---|---|
| | 1871 | 1901 | 1871 | 1901 | In Census | In Wealth per Child |
| Barnstable | 6,669 | 4,199 | $2,075 | $5,956 | −37% | +186% |
| Berkshire | 13,085 | 17,661 | 2,961 | 3,489 | +35% | +18% |
| Bristol | 19,979 | 45,971 | 4,317 | 4,173 | +129% | −03% |
| Dukes | 762 | 584 | 3,060 | 7,363 | −22% | +140% |
| Essex | 38,639 | 59,261 | 3,650 | 4,651 | +53% | +29% |
| Franklin | 6,068 | 7,187 | 2,445 | 3,222 | +18% | +32% |
| Hampden | 13,787 | 32,121 | 4,015 | 4,707 | +135% | +17% |
| Hampshire | 8,665 | 10,312 | 2,943 | 3,294 | +19% | +12% |
| Middlesex | 52,211 | 96,305 | 4,818 | 5,486 | +84% | +13% |
| Nantucket | 665 | 391 | 2,782 | 8,685 | −70% | +215% |
| Norfolk | 18,045 | 26,479 | 4,642 | 7,974 | +47% | +72% |
| Plymouth | 12,846 | 18,619 | 2,394 | 4,453 | +45% | +86% |
| Suffolk | 49,722 | 103,062 | 12,624 | 11,584 | +107% | −09% |
| Worcester | 37,116 | 60,959 | 3,284 | 4,068 | +64% | +24% |
| The State | 278,249 | 483,103 | 5,381 | 6,279 | +73% | +16% |

[1] *35th An. Rept. Bd. Educ., Mass.*, for the year 1871, pp. 117–132, with statistical tables, pp. 154–172.
*66th An. Rept. Bd. Educ., Mass.*, for 1901–2.

TABLE 130

RATE OF TAX LEVIED AND AMOUNT PRODUCED, WITH RELATIVE RANK, OF TWENTY-ONE MASSACHUSETTS TOWNS AND CITIES, 1901–02

(Data selected from Graduated Tables I and II in *66th An. Rept. Bd. Educ., Mass.* 1901–02, in "Abstract of School Returns" for the year)

| City or Town[1] | Rank in Amount Levied | Rate of Local Tax Levied | Amt. Produced per Pupil in Av. Memb. in School | Rank in Amount Produced |
|---|---|---|---|---|
| Seven levying highest rate— | | | | |
| West Boylston | 1 | 9.20 mills | $22.33 | 131 |
| Warren | 2 | 8.79 " | 19.17 | 216 |
| East Longmeadow | 3 | 8.56 " | 14.17 | 303 |
| Huntington | 4 | 8.50 " | 15.88 | 277 |
| Groveland | 5 | 8.29 " | 18.92 | 221 |
| Dighton | 6 | 8.18 " | 24.11 | 95 |
| Abington | 7 | 7.94 " | 25.44 | 75 |
| Seven largest cities— | | | | |
| Boston | 333 | 2.39 " | 33.86 | 15 |
| Worcester | 192 | 4.61 " | 28.45 | 40 |
| Fall River | 260 | 3.89 " | 22.03 | 137 |
| Lowell | 194 | 4.58 " | 30.73 | 21 |
| Cambridge | 219 | 4.33 " | 29.51 | 28 |
| Lynn | 196 | 4.56 " | 28.65 | 38 |
| New Bedford | 287 | 3.46 " | 26.99 | 42 |
| Seven levying lowest rate— | | | | |
| Brookline | 346 | 1.91 " | 51.68 | 3 |
| Hull | 347 | 1.73 " | 45.75 | 7 |
| Tolland | 348 | 1.61 " | 4.00 | 350 |
| Goshen | 349 | 1.50 " | 4.43 | 351 |
| Manchester | 350 | 1.37 " | 33.72 | 16 |
| Chilmark | 351 | 1.31 " | 9.37 | 343 |
| Nahant | 352 | 1.10 " | 52.10 | 2 |
| Gosnold | 353 | .85 " | 10.53 | 336 |

[1] The poorer towns received state aid in addition, which the cities did not.

TABLE 131

AN ANALYSIS OF THE RETURNS FOR FAIRFIELD COUNTY, CONNECTICUT, FOR THE SCHOOL YEAR 1901–02

(Calculated from data given in the *Rept. Conn. Bd. Educ.* for 1903, statistical tables, pp. 260, 261, 274, and 283)

| Towns | Total Valuation | Census 4-16 Yrs. Oct., 1901 | Valuation per Child | No. of Schools (Depts.) |
|---|---|---|---|---|
| Bridgeport | $61,560,175 | 17,369 | $3,544 | 219 |
| Danbury | 7,978,801 | 4,641 | 1,764 | 67 |
| Bethel | 1,189,543 | 715 | 1,663 | 18 |
| Brookfield | 431,200 | 196 | 2,200 | 8 |
| Darien | 2,606,241 | 443 | 5,883 | 11 |
| Easton | 489,310 | 189 | 2,588 | 9 |
| Fairfield | 3,360,460 | 953 | 3,526 | 17 |
| Greenwich | 8,758,830 | 2,662 | 3,294 | 50 |
| Huntington | 4,112,611 | 1,332 | 3,086 | 26 |
| Monroe | 357,500 | 194 | 1,843 | 7 |
| New Canaan | 1,939,190 | 594 | 3,265 | 17 |
| New Fairfield | 341,064 | 128 | 2,664 | 6 |
| Newton | 1,565,763 | 565 | 2,771 | 22 |
| Norwalk | 13,840,031 | 4,632 | 2,984 | 71 |
| Redding | 575,274 | 217 | 2,651 | 8 |
| Ridgefield | 1,879,961 | 549 | 3,424 | 17 |
| Sherman | 324,802 | 128 | 2,539 | 6 |
| Stamford | 10,531,321 | 4,567 | 2,306 | 92 |
| Stratford | 1,437,031 | 904 | 1,589 | 17 |
| Trumbull | 642,293 | 322 | 1,995 | 8 |
| Weston | 298,184 | 155 | 1,924 | 5 |
| Westport | 2,319,055 | 853 | 2,719 | 14 |
| Wilton | 870,014 | 374 | 2,324 | 11 |
| The County | $127,408,654 | 42,682 | $2,985 | 726 |

TABLE 131 (*Continued*)

| Towns | Av. Valuation Per School (Dept.) | Rate of Tax in Mills for $250 | Rate of Local Tax Levied 1901-02 | Cost per Pupil in Av. Dy. Att. for Maint. |
|---|---|---|---|---|
| Bridgeport | $281,097 | .88 mills | 3.26 mills | $28.06 |
| Danbury | 119,088 | 2.10 " | 4.40 " | 24.55 |
| Bethel | 66,085 | 3.79 " | 7.16 " | 18.70 |
| Brookfield | 53,900 | 4.64 " | 4.55 " | 20.25 |
| Darien | 236,840 | 1.05 " | 2.45 " | 33.79 |
| Easton | 54,364 | 4.60 " | 4.43 " | 21.07 |
| Fairfield | 197,674 | 1.26 " | 3.19 " | 29.09 |
| Greenwich | 175,177 | 1.43 " | 2.43 " | 24.50 |
| Huntington | 158,177 | 1.68 " | 3.20 " | 19.91 |
| Monroe | 51,071 | 4.90 " | 4.25 " | 17.01 |
| New Canaan | 113,481 | 2.20 " | 4.29 " | 26.22 |
| New Fairfield | 56,844 | 4.40 " | 3.89 " | 22.89 |
| Newton | 71,171 | 3.51 " | 3.97 " | 24.39 |
| Norwalk | 194,930 | 1.28 " | 2.93 " | 22.26 |
| Redding | 71,909 | 3.48 " | 2.96 " | 20.18 |
| Ridgefield | 110,586 | 2.26 " | 2.89 " | 20.95 |
| Sherman | 54,134 | 4.61 " | 3.47 " | 19.21 |
| Stamford | 144,471 | 1.73 " | 6.78 " | 30.40 |
| Stratford | 84,531 | 2.96 " | 6.76 " | 21.84 |
| Trumbull | 80,287 | 3.13 " | 5.19 " | 25.86 |
| Weston | 58,037 | 4.33 " | 3.07 " | 19.59 |
| Westport | 165,646 | 1.51 " | 1.85 " | 14.96 |
| Wilton | 78,183 | 3.19 " | 2.79 " | 15.87 |
| The County | $175,494 | 1.42 " | | $23.18 |

TABLE 132

ILLUSTRATING INEQUALITIES EXISTING IN THE STATE OF MISSOURI

(Calculated for the school year 1903–04 from statistical data given in the *Rept. State Supt. of Pub. Instr. of Mo.*, 1904)

| Counties | Total Valuation | Census 4-20 Years | Av. Val. per Census Child | No. Trs. Employed | Av. Val. per Tr. Employed | Tax in Mills for $250 per Tr. |
|---|---|---|---|---|---|---|
| Adair | $5,500,000 | 6,800 | $809 | 151 | $36,423 | 6.86 |
| Andrew | 7,572,928 | 5,020 | 1,508 | 108 | 70,119 | 3.56 |
| Atchison [1] | 8,389,345 | 4,775 | 1,757 | 126 | 66,582 | 3.75 |
| Audrain | 8,752,360 | 7,549 | 1,336 | 146 | 59,263 | 4.22 |
| Barry | 4,515,310 | 8,368 | 539 | 137 | 32,958 | 7.58 |
| Barton | 5,998,313 | 5,817 | 1,031 | 141 | 42,540 | 5.87 |
| Bates | 10,169,171 | 8,907 | 1,142 | 173 | 58,781 | 4.25 |
| Benton | 4,291,470 | 5,437 | 789 | 109 | 39,371 | 6.34 |
| St. Louis, City | 415,824,520 | 178,260 | 2,331 | 1,859 | 223,682 | 1.11 |
| The State | $1,284,294,571 | 995,536 | $1,290 | 17,036 | $75,387 | 3.32 |

[1] Due to an evident typographical error in the Report for 1904, the figures for this county were taken from the Report for 1903.

TABLE 133

ILLUSTRATING INEQUALITIES EXISTING IN THE STATE OF CALIFORNIA

(Calculated for the school year 1903–04 from data given in the statistical tables of the *21st Bien. Rept. Supt. Pub. Instr., Cal.*, 1903–04)

| Counties | Total Valuation | Census 5–17 Years | Av. Val. per Census Child | No. Trs. Employed | Av. Val. per Tr. Employed | Tax in Mills for $250 per Tr. |
|---|---|---|---|---|---|---|
| Alameda | $128,681,766 | 34,939 | $3,362 | 575 | $223,620 | 1.12 |
| Alpine | 422,063 | 78 | 5,411 | 3 | 140,688 | 1.77 |
| Amador | 4,918,908 | 2,389 | 2,059 | 63 | 78,236 | 3.18 |
| Butte | 16,057,766 | 4,677 | 3,433 | 108 | 148,683 | 1.68 |
| Calaveras | 6,177,275 | 2,631 | 2,348 | 73 | 84,620 | 2.96 |
| Colusa | 12,188,096 | 1,858 | 6,559 | 53 | 229,964 | 1.08 |
| Contra Costa | 21,753,956 | 4,897 | 4,442 | 98 | 221,979 | 1.13 |
| Del Norte | 2,882,445 | 678 | 4,251 | 18 | 160,136 | 1.56 |
| San Francisco | 564,070,301 | 97,353 | 5,794 | 996 | 566,336 | .44 |
| The State | $1,598,603,226 | 407,398 | $3,923 | 7,797 | $205,028 | 1.22 |

TABLE 134

HIGHEST AND LOWEST RATE OF TAX IN MILLS NECESSARY TO PRODUCE $250 BY LOCAL TAXATION, WITH STATE AVERAGES

(Compiled from the preceding tables)

| Table Number | Item | Rate of Taxation in Mills | | |
|---|---|---|---|---|
| | | Highest | Lowest | Average |
| 2 | 37 Massachusetts towns | 11.62 | .36 | |
| 6 | 8 Connecticut counties | 2.97 | 1.42 | |
| | State of Connecticut | | | 1.75 |
| 7 | 15 towns of Windham Co. | 8.41 | 1.35 | 2.68 |
| 8 | 23 towns of Fairfield Co. | 4.90 | .88 | 1.42 |
| 10 | 9 Wisconsin counties | 11.57 | .72 | |
| | State of Wisconsin | | | 1.95 |
| 11 | 8 Missouri counties | 7.58 | 3.56 | |
| | State of Missouri | .... | | 3.32 |
| 12 | 8 Kansas counties | 10.88 | 3.90 | |
| 13 | 9 California counties | 3.18 | .44 | |
| | State of California | | | 1.22 |
| 14 | 10 Indiana counties | 10.41 | 1.76 | |
| | State of Indiana | | | 2.99 |

TABLE 135

SUMMARY OF STATISTICAL TABLES SHOWING WEALTH, TAX RATE, AND COST OF SCHOOL BY COUNTIES [1]

| | Massachusetts | Washington | New York | Indiana |
|---|---|---|---|---|
| Per Capita Wealth— | | | | |
| Lowest | $535.00 | $44.00 | $328.00 | $222.00 |
| Highest | 1,982.00 | 2,436.00 | 1,507.00 | 1,375.00 |
| Medium | 700.00 | 640.00 | 682.00 | 576.50 |
| Local Rate, per $100 of taxables— | | | | |
| Lowest | .33 | .13 | .21 | .15 |
| Highest | .88 | 1.19 | .83 | 1.11 |
| Medium | .395 | .53 | .395 | .63 |
| Annual Per Capita Cost per Pupil Enrolled— | | | | |
| Lowest | $19.00 | $11.00 | $16.00 | $11.00 |
| Highest | 46.50 | 45.00 | 73.00 | 42.00 |
| Medium | 31.90 | 20.00 | 26.50 | 21.50 |

For the state of New York, a state in which total population is used as a partial basis for the apportionment of state funds, similar calculations from the returns of the School Commissioners for the first fifteen counties, as arranged in alphabetical order, cities omitted, give the results [2] shown in Table 136.

[1] Charles S. Meek, *State and Local Taxation for Public Schools*. Teachers College Record, Vol. XI, No. 5. All of the other tables are from Professor Cubberley's study.

[2] Calculated from data given in tables 3 and 4 of the *Rept. Supt. Pub. Instr. of New York*, 1902, Vol. II. The calculations are based on the National Census of 1900, the biennial state school census of 1901, and the number of teachers employed for the school year 1900–1901.

TABLE 136

THE RELATION OF THE NUMBER OF CHILDREN AND OF TEACHERS TO THE WHOLE POPULATION

| County | Children of Census Age | Teachers Employed per 1,000 Inhabs. | County | Children of Census Age | Teachers Employed per 1,000 Inhabs. |
|---|---|---|---|---|---|
| Albany | 20.1% | 5.4 | Clinton | 27.5% | 7.2 |
| Allegany | 21.5% | 10.5 | Columbia | 18.8% | 6.2 |
| Broome | 20.4% | 10.9 | Cortland | 19.0% | 10.5 |
| Cattaraugus | 19.7% | 7.9 | Delaware | 20.3% | 9.6 |
| Cayuga | 19.2% | 8.9 | Dutchess | 18.2% | 5.0 |
| Chatauqua | 21.4% | 9.5 | Erie | 25.0% | 5.9 |
| Chemung | 21.5% | 10.0 | Essex | 23.0% | 9.7 |
| Chenango | 19.0% | 9.9 | | | |

TABLE 137

PERCENTAGE ENROLLED AND THE VALUE OF THE STATE APPORTIONMENT ON ENROLLMENT FOR CERTAIN WISCONSIN COUNTIES

(Calculated on the basis of the census of the summer of 1903 and the enrollment for the school year 1903–04, from statistical data given in the *Rept. Supt. Pub. Instr., Wis.*, for 1903–04)

| Counties, Including Cities Under a City Superintendent | Percentage of Census, 4–20 Years Enrolled | Value of $1.82½ Census Apportionment on Actual Enrollment |
|---|---|---|
| Adams | 77% | $2.37 |
| Ashland* | 65% | 2.81 |
| Barron | 74% | 2.46 |
| Bayfield | 74% | 2.46 |
| Brown† | 51% | 3.58 |
| Buffalo | 67% | 2.73 |
| Burnett | 70% | 2.61 |
| Calumet | 50% | 3.65 |
| Milwaukee‡ | 43% | 4.24 |
| * City of Ashland, alone | 61% | 2.99 |
| † City of Green Bay, alone | 56% | 3.26 |
| ‡ City of Milwaukee, alone | 41% | 4.45 |
| State of Wisconsin, average | 61% | 2.69 |
| State, cities omitted | 65% | 2.81 |
| Cities alone | 52% | 3.51 |

TABLE 138

WHAT $1.00 OF CENSUS APPORTIONMENT IS WORTH ON TOTAL ENROLLMENT

| Counties, in Alphabetical Order, and Cities | Wis. | Kan. | Mo. | Cal. | Ind. |
|---|---|---|---|---|---|
| 1st | $1.30 | $1.49 | $1.25 | $1.43 | $1.45 |
| 2d | 1.54 | 2.22 | .97 | 1.28 | 2.08 |
| 3d | 1.35 | 1.16 | 1.05 | 1.28 | 1.35 |
| 4th | 1.35 | 1.54 | 1.28 | 1.17 | 1.20 |
| 5th | 1.96 | 2.08 | 1.00 | 1.32 | 1.26 |
| 6th | 1.49 | 1.19 | 1.07 | 1.20 | 1.22 |
| 7th | 1.43 | 1.11 | 1.11 | 1.15 | 1.32 |
| 8th | 2.00 | 1.16 | 1.29 | 1.28 | 1.25 |
| Largest city | 2.44 | 1.73 | 2.08 | 1.56 | 1.47 |
| Second largest city | 1.89 | 1.59 | 2.17 | [1] | 2.17 |
| Third largest city | 1.92 | 1.52 | 3.59 | [1] | 2.38 |

TABLE 139

SHOWING WHAT SMALL COUNTRY SCHOOLS OF CERTAIN SIZES IN WISCONSIN WOULD RECEIVE UNDER CERTAIN PLANS OF APPORTIONMENT, BASING CALCULATIONS ON TOTAL APPORTIONMENT, CENSUS, ENROLLMENT, AND ESTIMATED AVERAGE DAILY ATTENDANCE

(Calculated for 1903–04 from statistical data given in the *Rept. Supt. Pub. Instr., Wis.*, 1903–04. See similar preceding tables. The different apportionment values are calculated on the state averages, but the percentages used in the table are those for town and country schools only)

| Census, 4–20 Years | Enrollment at State Average without Cities, of 65% | Amount of State Aid Apportioned on | | | |
|---|---|---|---|---|---|
| | | Census, 4–20 Years of Age, at $1.82½ | Total Enrollment at $2.99 | Forty-day Enrollment with 20% loss, at $3.52 | Av. Dy. Att. at 70% of Enrollment, and at $4.15 |
| 11 | 7 | $20.08 | $20.93 | $21.12 | $20.75 |
| 16 | 10+ | 29.20 | 29.90 | 28.16 | 29.05 |
| 23 | 15 | 41.98 | 44.85 | 42.24 | 41.50 |
| 31 | 20+ | 56.38 | 59.80 | 56.32 | 58.10 |
| 39 | 25+ | 71.18 | 74.75 | 70.40 | 70.55 |
| 46 | 30 | 83.95 | 89.70 | 84.48 | 87.15 |
| 62 | 40+ | 113.15 | 119.60 | 112.64 | 116.20 |
| 77 | 50 | 140.53 | 149.50 | 140.80 | 145.25 |
| 92 | 60— | 167.90 | 179.40 | 168.96 | 174.30 |
| 108 | 70+ | 197.10 | 209.30 | 197.12 | 203.35 |
| 123 | 80 | 224.48 | 239.20 | 224.38 | 232.40 |
| 137 | 89 | 250.03 | 266.11 | 249.92 | 257.30 |

[1] Data for calculation lacking.

TABLE 140

APPORTIONMENTS OF FOUR SCHOOLS COMPARED ON THE CENSUS, TOTAL ENROLLMENT, FORTY-DAY ENROLLMENT, AND AVERAGE DAILY ATTENDANCE BASES

| | State No. 1 | | State No. 2 | |
|---|---|---|---|---|
| | Per Cent | Number | Per Cent | Number |
| Total school census of each district | 100% | 40 | 100% | 40 |
| Per cent of census enrolled | 75% | 30 | 80% | 32 |
| Loss on a forty-day enrollment | 15% | 25.5 | 19% | 25.9 |
| Av. Dy. Att. on enrollment— | | | | |
| The general state average | 60% | 18 | 75% | 24 |
| Averages of Districts A and B | 70% | 21 | 85% | 27.2 |
| Averages of Districts C and D | 50% | 15 | 65% | 20.8 |

On a basis of a per-capita on census apportionment of $1.00 this gives the following per-capita values for the state apportionment in each state:

TABLE 141

| | State No. 1 | State No. 2 |
|---|---|---|
| Apportionment on census | $1.00 | $1.00 |
| Apportionment on total enrollment | 1.333+ | 1.25 |
| Apportionment on forty-day enrollment | 1.569+ | 1.543+ |
| Apportionment on average daily attendance | 2.222+ | 1.666+ |

Using the above values for calculation we get the following for a school of forty census children, calculated on the state averages:

| | On Census | On Total Enrollment | On Forty-day Enrollment | On Av. Dy. Att. |
|---|---|---|---|---|
| State No. 1 | $40.00 | $40.00 | $40.00 | $40.00 |
| State No. 2 | 40.00 | 40.00 | 40.00 | 40.00 |

This is only a natural result. There being only so much money to be distributed, a school, whatever its size, will always get the same amount of money on any basis of distribution, so long as the

average for the school is the same as the average for the state. It is only when the school varies from the state average that it gains or loses. This may be shown by making similar calculations for the four schools, A, B, C, and D, which varied from the state averages in average daily attendance, as given above. Doing this, we get the following result:

| District | On Census | On Enrollment | On Average Daily Attendance | |
|---|---|---|---|---|
| | | | State No. 1 | State No. 2 |
| A. | $40.00 | $40.00 | $46.66 | |
| B. | 40.00 | 40.00 | | $45.33 |
| C. | 40.00 | 40.00 | 33.33 | |
| D. | 40.00 | 40.00 | | 34.66 |

TABLE 142

INCOME OF A CITY SCHOOL AND A SMALL COUNTRY SCHOOL COMPARED UNDER THE CENSUS, AVERAGE DAILY ATTENDANCE, AND AGGREGATE DAYS' ATTENDANCE BASES

| School | Census | Enrollment | Av. Dy. Att. | Term |
|---|---|---|---|---|
| Country | 29 | 20 | 14.5 | 127 days |
| City | 73 | 50 | 36.5 | 200 " |

| School | Census at $2.90 | Value of State Apportionment on | |
|---|---|---|---|
| | | Av. Dy. Att. at $5.36 | Av. Dy. Att. × Term at 3½c. per Pupil per Day |
| Country | $84.10 | $77.72 | 14.5×127×.03½ = $64.45 |
| City | 211.70 | 195.64 | 36.5×200×.03½ = 256.30 |

TABLE 143

EFFECT OF AN APPORTIONMENT ON CENSUS AND ON TEACHERS COMPARED FOR CERTAIN WISCONSIN COUNTIES

| County | Tax in Mills to Raise $250 per Teacher | Av. Value of State Apport. per Teacher Employed | Tax in Mills for Balance of $250 per Teacher | Value of State Apport. on Teacher Basis | Tax in Mills for Balance of $250 per Teacher |
|---|---|---|---|---|---|
| Adams | 6.75 | $46.40 | 5.50 | $103.36 | 3.96 |
| Ashland | 3.14 | 96.44 | 1.93 | 103.36 | 1.90 |
| Barron | 5.83 | 84.61 | 3.84 | 103.36 | 3.41 |
| Bayfield | 2.03 | 84.55 | 1.34 | 103.36 | 1.18 |
| Brown | 1.56 | 176.69 | .46 | 103.36 | .86 |
| Buffalo | 3.04 | 87.58 | 1.97 | 103.36 | 1.74 |
| Burnett | 11.57 | 60.37 | 8.78 | 103.36 | 6.07 |
| Calumet | 1.44 | 134.38 | .66 | 103.36 | .84 |
| Milwaukee | .72 | 193.29 | .17 | 103.36 | .42 [1] |

TABLE 144

EFFECT OF AN APPORTIONMENT ON CENSUS AND ON TEACHERS COMPARED FOR CERTAIN MISSOURI COUNTIES

| Counties | Tax in Mills to Raise $250 | Av. Value State Apport. per Teacher Employed | Tax in Mills for Balance of $250 | Value of State Apport. on Teacher Basis | Tax in Mills for Balance of $250 |
|---|---|---|---|---|---|
| Adair | 6.86 | $ 58.14 | 5.27 | 75.44 | 5.07 |
| Andrew | 3.56 | 60.00 | 2.70 | 75.44 | 2.49 |
| Atchison | 3.75 | 47.00 | 3.05 | 75.44 | 2.62 |
| Audrain | 4.22 | 57.91 | 3.24 | 75.44 | 2.93 |
| Barry | 7.58 | 78.85 | 5.20 | 75.44 | 5.29 |
| Barton | 5.87 | 53.26 | 4.60 | 75.44 | 4.11 |
| Bates | 4.25 | 66.46 | 3.12 | 75.44 | 2.97 |
| Benton | 6.34 | 64.39 | 4.70 | 75.44 | 4.43 |
| St. Louis (City) | 1.11 | 123.79 | .56 | 75.44 | .78 [2] |

[1] To produce the balance of $500 instead of $250 per teacher employed, this rate would be only 1.85 mills; and to produce the balance of $800 per teacher, the rate would be but 3.24 mills.

[2] To produce the balance of $500 instead of $250 per teacher employed, this rate would be only 1.15 mills, and to produce the balance of $750 per teacher, the rate would be but 1.87 mills.

It is interesting to note that since Professor Cubberley's investigation was published several states have undertaken to revise the basis for apportioning their school moneys. In two of them at least, to the writer's personal knowledge, Dr. Cubberley's book was continually consulted by the legislative committee which prepared the bill embodying the new basis of apportionment.

The plan not uncommonly found of giving special aid for the newer types of educational endeavor is to-day receiving wide recognition in the special subsidies which are being granted for industrial schools. Doubtless it will always be necessary to reserve a part of the state money for the encouragement of those educational experiments which need not simply state aid but also the stamp of approval thus given.

Along with the provision made through the equitable distribution of school funds for equality of educational opportunity and of the burden sustained in supporting education, there should be developed a system of fines or penalties, enforced by withholding state funds, which will operate to secure the enforcement of the educational laws of the state. A community which fails to enforce the compulsory education law, which violates the regulations with respect to proper school accommodations, which hires a teacher whose training is less than that required by law, or which in any other way falls below the minimum standard established by the state can be made to recognize the importance of compliance with state regulations without difficulty when the state money is withheld wholly or in part. Unless some such penalty is attached the least progressive communities, the one for which the minimum standards of efficiency are made, will have little respect for the laws enacted for the benefit of the children of the state.

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